UNIVERSITÉ DES SCIENCES ET TECHNOLOGIES DE LILLE 1

INSTITUT D'ADMINISTRATION DES ENTREPRISES

École Doctorale: Sciences économiques, sociales, de l'aménagement
et du management (SÉSAM)

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Directeur de recherche: Pr. Dominique BESSON

Modèle d'excellence de l'organisation virtuelle

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"The reason that I might see further is because
I am standing on the shoulders of giants"

Isaac Newton

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Bahar Mazandarani,
Spring 2015

Résumé

Objet - Une organisation virtuelle (Virtual Organization, VO) est une organisation avec des éléments et des ressources organisationnelle non co-localisés et qui utilise l'espace virtuel pour les interactions entre ses personnels afin d'atteindre les objectifs organisationnels. L'objectif de cette étude est de développer un modèle d'excellence pour les organisations ainsi définies. A cette fin nous avons choisi comme point de départ le modèle de la «fondation européenne pour la gestion de la qualité » (*European Foundation for Quality Management*, EFQM) qui peut être considéré la plus récente expression du TQM, approche dominante de l'excellence. Pour créer un modèle complet, nous avons conçu tout d'abord un modèle conceptuel basé sur le même état d'esprit que l'EFQM. En seconde étape nous déterminons les facteurs, leurs poids et sous-critères. Nous avons développé le modèle d'Excellence pour l'Organisation Virtuelle en tant que feuille de route des VO pour l'excellence et en même temps pour être une aide aux entrepreneurs en vue de mesurer et améliorer la performance de leur entreprise. Ce modèle pourrait également être un outil pour les experts et analystes de cette nouvelle génération d'organisations. La dernière étape détermine les valeurs fondamentales et le cadre de mesure RADAR.

Conception / méthodologie - Cette étude a adopté une approche pluraliste, comprenant un large examen de la littérature, une expérience de terrain, des entretiens approfondis et une enquête par questionnaires pour développer un modèle complet d'organisation virtuelle. Pour l'étape expérimentale, une organisation virtuelle appelée "Tstab" a été fondée et son fonctionnement a été étudié et mesuré pendant la première année de son activité. La revue élargie de littérature et l'expérience de terrain ont créé la base solide de développement d'un modèle complet contenant 300 propositions. Le modèle final s'est basé sur un questionnaire comportant 59 items avec échelle de Likert à 10 niveaux prolongé par des entretiens approfondis et une mini-conférence d'experts. Le questionnaire en tant qu'instrument de mesure a été évalué en termes de fiabilité et de validité en utilisant les techniques d'analyse des facteurs, de corrélations multiples, et d'alpha de Cronbach. Les poids des critères ont été calculés en utilisant les coefficients des facteurs de régression.

Résultats - Les critères et sous-critères du modèle d'excellence d'organisation virtuelle ont été confirmés en employant des données empiriques et les valeurs fondamentales et les poids des critères ont été proposés.

Intérêt de l'étude - Comme les VOs représentent l'avenir des entreprises, le principal avantage du modèle d'excellence d'organisation virtuelle est de fournir une feuille de route d'amélioration de la productivité pour toute entreprise virtuelle, développée et évaluée par des experts de l'organisation virtuelle.

Mots-clés - Organisation virtuelle, Information and Communication Technologie (ICT), gestion des connaissances, équipe virtuelle, V-leadership, organisations traditionnelles, gestion de la qualité totale, modèle de la Fondation européenne pour la gestion de la qualité.

Abstract

Purpose – Virtual Organization would be any organization with non-co-located organizational entities and resources, using virtual space for interactions between staff to achieve organizational objectives. The purpose of this thesis is to develop an Excellence model for Virtual Organizations. We chose "European foundation for productivity management model (EFQM)" as the latest expression of TQM which is the dominant approach of Excellence. To create a complete model we first designed a conceptual model in the same culture of EFQM. In the second step we determined factors, their weights and sub-criteria. We developed the Virtual Organization Excellence model as a roadmap for Virtual Organizations to move toward excellence and also being an aid for contractors in measuring and improving their business performance. This model also could be a tool for assessor to analyze this new generation of organizations. Last step was determining the fundamental values and RADAR measuring framework.

Design/methodology – This study adopted a pluralist approach including, Extensive literature review, Field experiment, in depth interviews and Survey questionnaire to develop the Virtual Organization excellence model. In field experiment step, a virtual organization called "Tstab" built and its operation studied and measured during first year of activity. Extensive literature review and field experiment created a solid ground to develop an excellence model containing 300 statements. The final model was based on the 59 statement questionnaire in Likert 10 scale which developed after in depth interview and expert meeting. The questionnaire as a measuring instrument was evaluated in terms of reliability and validity using techniques such as factor analysis, multiple correlations, and Cronbach's alpha. The weights of the criteria were empirically calculated using factor regression coefficients.

Findings – The criteria and sub-criteria of the Virtual Organization excellence model were confirmed using empirical data, and the fundamental values and criterion weights were suggested.

Value of study – As VOs are the future of firms, main benefit of the Virtual Organization excellence model (VOEM) is that it provides a productivity roadmap for a Virtual firms that developed and evaluated by Virtual Organization experts.

Keywords – Virtual Organization (VO), Information and Communication Technology (ICT), Knowledge Management (KM), Virtual Team (VT), V-Leadership, Traditional organizations (TO), Total quality management, European foundation for quality management model (EFQM).

Introduction

I. VO Truth of a agile world

The topic of virtual organization brings together theories about the nature of work in the information age, the organization of social behavior, and the role that technology plays in the evolution of social structures. Virtual organizations are seen as the emerging standard in business, resulting from technological advances and changing expectations on the part of consumers and collaborators and they are here to stay. (Goldman, Nagel, Preiss 1995; Davidow, Malone, 1992).

With information processing and telecommunications networks continuing to expand, corporations that use these technologies to their full potential will succeed, and in this process raising the standard for competition higher than traditional forms of organization can achieve. Davidow & Malone (1992) described the distinguishing characteristics of a virtual corporation as a focus on change, being customer-driven and managed and the presence of highly skilled workers working in a collaborative climate. Virtual corporations succeed when they develop relationships with their clients that last three to four product generations and include a broad variety of services related to a product.

Understanding virtual organization as process entails a focus on how relationships are perceived by the individual actors whose communication behaviors constitute them. In effect, virtual organization can only occur if the participants accept a mindset different from the traditional perspective on the formality, proximity, and functions of relationships.

This mindset highlights the need for trust between partners and clients separated in space to facilitate the responsiveness of corporations to opportunities. A violation of trust by any party will force the imposition of control mechanisms that make flexible and quick responses impossible (Handy, 1995). Without trust, corporations will be unable to quickly pull together the necessary resources to take advantage of an emerging market, and clients who do not trust a corporation will simply go elsewhere to satisfy their needs. Thus, participants in a virtual web must be able to trust each other's competency and responsiveness for virtual organization to succeed.

This new kind of organization occurs when actors use telecommunications technology expressively; under network and hierarchy organization, the use is primarily classical, supplementing proximal factors. As technology makes it unnecessary for staff members to encounter each other face to face, this freedom is exploited to lower overhead costs, place agents in the field, and improve accessibility to a variety of information resources. (Preston, 2002)

Although a virtual organization is the Web-based form of a traditional organization, it has several characteristics that distinguish it from the latter. Table below, lists the primary differences between a virtual and a traditional organization.

Virtual Organization	Traditional Organization
Do not usually have any physical presence.	Have physical existence and permanence like real world offices and continuity in their operations.
No face-to-face communication in 100% virtual ones Rely on electronic communication to share information.	Existing of physical contact and face-to-face communication among the employees.
The membership is dynamic in nature	The membership tenure is normally stable.
Keep a flatter hierarchy and insist on voluntary commitment	Maintain a vertical hierarchy and follow an imposed discipline system.
Performance evaluation and work control are virtual and difficult.	They are actual and simple.
The HR department is usually web-based and built on partnership.	It is physical and built on personnel management.
Statutory HR practices governing the functioning of employees are not clear and effective, but evolving	They are well-established with proven effectiveness.
Leadership and control are self-managed	They are based on external command and control.
The employees' skills and knowledge are usually developed through the e-learning process.	They are usually developed through real training and development programmers.
The power of employees depends on their role in business process.	It depends upon the positions occupied by the employees in the hierarchy.

Table 1: Primary differences between a virtual and a traditional organization (Durai P ,2012).

II. Necessity of an excellence model for VOs

Management of organizations in a complex and changing world presents a major challenge. Making sense of conflicting priorities, allocating limited resources, understanding the impact of the organizations actions, comparing performance with competitors and responding to customer needs are just some of the issues management have to address. Balancing the effort of the organization to address these and many other issues and challenges faced can be a daunting task. For many organizations there is no time to adopt a systematic approach to the challenge. Some organizations seek solutions that avoid the complexity described above. They search for the solution, the initiative that will provide the answer and magically transform their performance and create success.

In the other hand Business Excellence theory is all about making organizations perform better; produce better profits; achieve success; deliver its aims .This theory contains a set of principles and tools that can be used to improve any organization, but as is the case with any tool it can also be misused and its value diminished or lost. It's about delivering real bottom line improvements in performance to private and public sector organizations. But, how about Virtual Organization, Do they need an Excellence model?

As Goldman et al. (1995) argue to be successful; each firm must focus on achieving world class excellence. Virtual Organization as a new form of enterprises must have a roadmap toward this excellence. Having Business Excellence model and benchmarking based on it, provides the path for success in today's and tomorrow's world.

Among all of the quality and Excellence models in the world, EFQM Excellence Model is a widely used organizational framework, with more than 30,000 organizations using it. In recent years, more and more countries started implementing the Model, especially across Middle East, Asia, Africa and South America. But how many of the enterprises that got assessed based on this model was Virtual organizations? According to the difference between Virtual and Traditional Organizations, there must be some difficulty and challenges while implementing EFQM in a VO!

That is Obvious, these organizations has their own characteristics which affect the way they need to change their process to be more productive. The necessity of having an Excellence model for Virtual Organizations is:

1. The available EFQM model designed for traditional organizations and doesn't fit the VOs characteristics.
2. An especial VO excellence model will have major impact on competitiveness and performance of a VO.
3. VO excellence model is relevant for long-term competitiveness and sustainability, and there is only minor changes needed to the design the better frameworks.
4. VO excellence model will be one of the over-arching frameworks within which other initiatives/quality tools fit.
5. Focus on implementing the core concepts of excellence model and the ability to clarify where a VO is on its journey.
6. Virtual Organizations can benchmark and learn from other firm's best practices in their market.

III. Basis of current study

This study analyses different aspect of virtual organizations and tries to evaluate effective and productive routines among them. Based on research methodology (Extensive literature review, lesson learned in field experiment, deep interviews and meeting with experts) researcher came up with a specific categorization which became the basis for developing a questionnaire to create an excellence model for Virtual Organization (VOEM).

Here we are introducing main characteristics of an excellent virtual organization:

ICT framework:

A productive and excellent virtual organization is an enterprise with a task-fit ICT framework characteristic. This framework is user-friendly and provides, email, Instant Messaging, groupware/Shared Services ,web conferencing, remote access, file transfer, report generating, teleconferencing ,voice-data conversations at the same time and well graphically design to be like a "Real" physical space . Managing, maintaining and developing the ICTF periodically would be easy and possible. This ICTF have cloud computing ability (SaaS (Software as a service), PaaS (Platform as a service) or IaaS (Infrastructure as a service)) to decrease system errors and prevent threats such as hardware damage, supply failure, fire, flood, etc compared to in-house server .

Environment (stakeholders, Customers, Suppliers, partners, competitors):

A productive and excellent Virtual organization is an enterprise that quality of the products or service offered to customer gets compared with competitors and will be revised periodically. Detailed information about market, competitors, legal and environmental issues ,all the partner's comments and feedbacks is available in the VO. Customer's full experience from ordering the product ,assigning the best team for the project to final delivery get designed in the best way. In VO's ICT portal there is an access point for customers to see and comment in different steps of project. In the other hand VO's market got analyzed to develop new products or services ahead of competitors.

Customers also get full (24/7) support after purchasing their product or service. To have a strong relationship with partners VO must have common inner criteria with them like: matching goals, algorithms, skills and capabilities, technical and economical preferences, common collaborating infrastructure and commitment to provide best quality .Having common outer criteria with partners are important too, like: cost requirement, collaboration history, reliability indicators, and readiness to join the collaborative process. Each partners or suppliers have an access point in VO's portal to share knowledge.

Knowledge:

A productive and excellent virtual organization is an enterprise that knowledge in all shape of it would get identified from projects, communications, environment, staff experience, feedback, share recourses (like calendars), teams, customers, suppliers, competitors, standards, lessons learned, benchmarking, suggestions, innovations , scientific documents. This data gets categorized and reviewed to prevent any redundancy. All members are a part of creating knowledge; they use recent data and reflect the results after finalizing the projects. These new data get identified and categorized for future improvement .On the other hand each VO member have a level of permission that shows who can access what in knowledge database. All the knowledge and data get enriched by share and use data by any individual or group.

Leadership:

A productive and excellent virtual organization is an enterprise that has a leadership which creates clear strategy, policy, mission, values, goals, objectives, culture, behaviors, performance metrics, and VO governance principles, quality improvement rules, based on the present and future expectations of all stakeholders. Leader also should review and update them periodically. This leaders participating, supervising, supporting and giving feedback about continuous excellence improvement processes based on content of ICT framework. They chose the most appropriate and suitable ICT framework for VO which handles all interactions with suppliers, partners, competitors and society including finding, negotiating and e-contracting (information, pre-contractual, contracting, and enactment phases).

They clearly determining VO's structure, business/collaboration process, access levels (assets/resources, intellectual property, etc) for each position using best potentials in ICT framework. They also clarify communication protocols (what, to whom, when, and how),

supervise and give feedback. Besides, Leaders clearly define job descriptions, performance appraisal, career development, compensation, recruitment, training, professional skills development, benefits and compensation and ensures legal compliance according to VO's policy and strategy.

VO Leader is more a coach and moderators of functions. Virtual leader is sensitive to member's schedule, gets to know them, have one-to-one contact with all members to build relationships, inspire them to have a positive competition, using effective and suitable motivation methods to build trust. They relate to members at their own levels, appreciates their opinions and suggestions, care about their problems, expresses a personal interest in them, maintain a consistent trust, providing feedback.

Process:

A productive and excellent virtual organization is an enterprise which all the processes get designed and managed in order to create best usage of resources, reduce staff time and costs, distribute information and knowledge, cope with location and time zone barriers, reducing and optimizing physical, economic and financial resources, find out employee opinions, and represent flatness and agility and create high degree of cohesion in VO. In such organization there are open and transparent formal communication procedures within staff, customers, and suppliers. All the process being improved as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders and are fitting Task-Technology-Structure concept of VO.

Teams:

A productive and excellent virtual organization is an enterprise made from teams(staff) which have an interactive relationship between employees, have clear understanding of role, can see that their opinions are taken into account when defining organizational objectives, and they are involved in decision making and setting goals collectively. There is a powerful reward system structure in which people are rewarded, recognized and cared for their achievements at work based on: meeting customer's and the organization’s objective, skill-based criteria, learn the necessary new skills. There is a special training (just-in-time learning) topic which teams needed to have like: self managing skills, intercultural communication and meeting, trust building, project management skills, ICT framework training, language and balance between Technical and Interpersonal Skills, based on each position competences .

There is a great and stable trust that means the willingness to cooperate, share, and give feed back inside teams to others despite of high turnover of VO members. They have united team spirit & belonging which prevents isolation and detachment. Team members provide feedback to leader and other members about their performance using communication tools like text, chat, email and collaborative software systems, videoconferencing, face-to-face meeting (if it would be possible once in awhile), voicemail messages. Team members have a unique VO culture beyond gender, age, ethnical background, personal tastes or preferences,

language, theoretical framework, history, individual assumptions, values, biases, goals, styles.

VO team members have ability to analyze, manage data, plan, and organize self work to correspond to team schedules, report progress and problems, monitor and control costs, take actions to get back on track, document and share learning. They have self management skills like: ability to establish personal and professional priorities and goals, recognizing opportunities for individual learning and growth, taking the initiative to change working methods and processes, social adequacies. Being adaptable, plan-ahead, well organized, flexible, low levels of neuroticism, resilient, extroverted, self-confident, and open to new experiences highly self-motivated, developing plans to meet those goals, executing plans, multi-tasking, influential, strong sense of urgency and drive.

Result:

A productive and excellent virtual organization is an enterprise analyzing its achieved results like quality management, adherence to preset budget, any reduction of costs, any increase in productivity, accuracy of financial contracts, development of new business, mission clarity. In supervising results in an excellent VO, there is a strategy to see if they are helping organization to get to its ultimate goal .Any increase or decrease in staff turnover, degree of task flexibility, accomplishment of assigned tasks, task efficiency, commitment and involving to the work is reviewed carefully are another measures that this kind of organizations see carefully. Also checking financial results like profitability (costs versus revenue), improvement of products or services and sales per employee, market share growth are important.

This kind of firms observe any change in quality of leadership roles execution, virtual team management, coaching new team members, suggesting internal quality improvement strategies opportunities for promotion. This kind of VO reviews environmental feedback like any change in number of customers, suppliers, partners, competitors, and their satisfaction. Any change in satisfaction indicator between members like role stressors, happy relation with their supervisors, committed to VO, levels of satisfaction with peers is important. Any higher performance in reduction of timing from order to delivery, improvement in customize product or service, decrease resources consumption, reduced staff time and costs, improve process efficiency and productivity.

IV. Outline of this manuscript

General objective of this PhD study is to develop a business excellence model for Virtual organizations. In this thesis we will make a research design mainly to develop a model for managing VOs toward excellence. In this process we will work with VO, EFQM and Excellence practitioners and this will lead us to be more practical action oriented rather than a pure academic results.

To have an overall view about what we will develop in each part, here we provide an overview for each chapter.

Since this study has the comprehensive horizon, for the purpose of this project, in **chapter 1** we need to have a thorough understanding of Virtual Organizations and Total quality management and EFQM as the last expression of this dominant approach of excellence which is TQM. Therefore, this chapter is dedicated to review of literature of VOs, their various aspects, interrelation between all the elements, conceptual and functional VO models, Quality models and specially EFQM.

In **Chapter 2, part 1**, is dedicated to epistemological background of the study. In this section we will review some basic epistemological debates and questions to reach an understanding of what we are dealing with in our current project and what is the most compatible approach that we can take here.

Chapter 2, part 2, belongs to research methodology. In this section, we defined the problems to be addressed in this study and the multi–method research strategy that supported the exploratory and descriptive nature of the research. This part discusses about the overall study design and the study's multiple data collection and data analysis activities used to collect sufficient data to answer the study's research questions. The chapter also highlights methodological issues and limitations encountered by the researcher.

In **Chapter 3**, study data will be statistically analyzed. These analyses performed using SPSS 16.0, IBM AMOS 22.00 provided in two parts of descriptive and deductive analysis to get to the target of the research and answer to fundamental questions one by one (Tables and graphs are used when appropriate).

Chapter 4 is dedicated to VO's excellence model and its layers. In this chapter we will discuss about how results of the research lead us to developing virtual organization excellence model. Then we will summarize the findings and discussions of this study, draw some conclusions based on these results, and propose areas of research that need to be developed and studied further.

1. Chapter one: Theoretical Background and Review of Literature

1.1. Part 1: Virtual Organization

From World War II until the early 1980s, the trend was to build increasing layers of management with more staff specialists. This was a centralized hierarchical structure. The traditional hierarchy was seen as effective way for managing large number of workers, but lacked agility and was unable to process information rapidly throughout the organization.

Since the 1980s, many organizations have flattened their structures by shifting authority downward, giving employees increased autonomy and decision-making power. Advantages of flatter organization forms include a decreased need for supervisors and middle management, faster decision making, and the ability to process information faster because of the reduced number of layers in the organization. A consequence of flatter organizations is that employees tend to be more dispersed both geographically and organizationally. To respond to this problem of dispersion, many organizations have eliminated superfluous processes and begun focusing on their core and value-added business. Flat organizations using joint ventures and strategic alliances are providing increased flexibility and innovation, and are replacing many traditional hierarchies.

Since the 1990s, globalization, competition and the drive for profitability and productivity have resulted in the adoption of new forms of working like multi-divisional organization in projects, temporally teams around a project, joint ventures, and so on. These new structures supported by emergent communications, collaboration and information technologies. IT-enabled organizations increasingly use virtual organizing of their labor as an integral part of internationalizing their operations, flattening the structure and lifting performance (Lipnack & Stamps, 1997; Venkatram & Henderson, 1998).

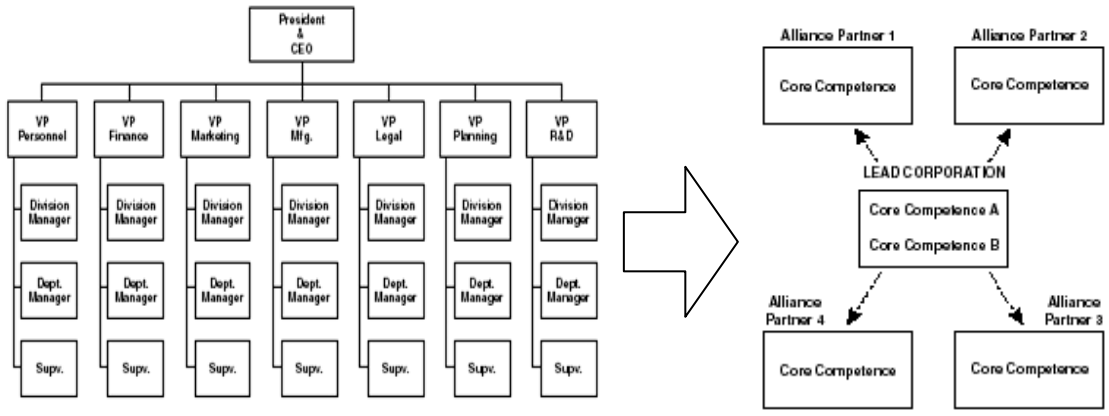


Figure 1 : From the traditional hierarchy to the virtual corporation

The multidimensional structures are trying to benefit from several types of structural organization, to handle complex tasks and to build more complicated products (Davis, Lawrence, 1977; Daniels et al. 1985). It seems like a compromise (Desreumaux, 1992) which overcomes the disadvantages of the organizations pyramidal and bureaucratic structure and provides flexibility to respond to change and uncertainty in the environment and prevents organizational pathologies.

One of the main solutions founded in 21 century is to use virtual organizing structure. By "virtual organizing" we mean the inclusion of employees and sometimes other organizations and contractors in different locations as members of the organization in a range of structures from partially collocated to totally disperse (Jackson et al., 2006). This term was first used in the context of computers; it applied to things simulated by the computer. For instance, "virtual memory", referred to memory that is not actually built into the processor. The term "virtual memory" was used to describe "a way of making a computer act as if it had more storage capacity than it really possessed" (Byrne, 1993). It was therefore perhaps a natural progression to extend this connotation of virtuality to the organization while extending the organizational boundaries in terms of reach and resources that were not in the same physical space.

Recent years have seen an enormous interest in the study of virtual organizations (VOs). Contributions have looked at several manifestations of these, like outsourcing (Elmuti & Kathawala, 2000), supply chain (Weber, 2002) and multinational enterprises (Sieber and Griese, 1998; Teece, 1981). Various issues pertaining to VOs have been examined, like information technology (Strader et al., 1998; Igbaria, 1999), trust (Handy, 1995; Jarvenpaa & Shaw, 1998), design (Katzy, 1998) and knowledge management (Kotnour & Proctor, 1996). Other researchers have recognized a similar problem, focusing on virtual teams (Griffith et al., 2003; Kirkman & Mathieu, 2005) or the virtual work environment (Watson-Manheim et al., 2002).

This explains that the VOs have been approached from very diverse points of view, and the fact that VO has been given very different definitions. This kind of organization has been variously defined as "a temporary network of independent companies" (Byrne, 1993), "a bundle of competencies [. . .] pulled together to deliver a value" (Donlon, 1997), "an opportunistic alliance of core competencies" (Goldman et al., 1995), "an ever-varying cluster of common activities in the midst of a vast fabric of relationships" (Davidow & Malone, 1992), "a way of structuring, managing and operating dynamically" (Mowshowitz, 1997), and "organization in which workers are not physically but instead electronically connected" (Fulk & DeSanctis, 1995). There are also researchers who have attempted to distinguish between VO relationships and other relationships like strategic alliances or joint ventures (Syler & Schwager, 2000; Bauer & Koszegi, 2003).

As the demographics of virtual organization in today's world, in November 2005, Fast Company reported that there were 19.5 million "distributed workers" up from 10.9 million in 2000. Charles Grantham and James Ware, executive producers of Work Design Collaborative, in Prescott, Arizona, estimate that currently, about 12% of the U.S. workforce qualifies as distributed but in urban areas, they figure the number is closer to 15%. In that point of time Gartner Research predicts that by 2008, 41 million employees around the world will spend at least one day a week teleworking and nearly 100 million will work from home at least one day each month. The largest proportion of these employees is anticipated to be workers in the United States.

According to Business Week, many technology companies are already operating successfully with virtual teams and as virtual organizations. The magazine reported in its December 12, 2005 issue that at IBM, 40% of the workforce does not have an office at the company; at AT&T, a third of managers are now off-site; at Sun Microsystems, nearly 50% of employees can work from home, cafés, drop-in centers, a company office, or some combination thereof saving the company $300 million in real estate costs. Sun says its virtual workers are 15% more productive than their office-tethered brethren. In 2003, Agilent closed 48 U.S. sales offices and sent people home to work. The company estimates that these virtual workers cost 60% less. Business Week says, "Indeed, at many companies across America, the most innovative new product may be the structure of the workplace itself" (Ken Blanchard Companies, 2013).

However, the existing literature on the subject provides multifarious views of virtual organizations, making it difficult to compare findings in research and derive actionable inputs for practice. Hence a simple working definition of a VO would be any organization with non-co-located organizational entities and resources, necessitating the use of virtual space for interaction between the people in these entities to achieve organizational objectives (Shekhar, 2006). In this chapter we will cover each definition as a point of view to look at VOs.

The basic objective of a VO in the current globalized context would be to enable business processes or activities to be performed using geographically dispersed resources across one or more organizations for increasing competitiveness. Given this overarching definition of a VO, we now proceed to understand how we can accommodate various manifestations of a VO in a common conceptual framework, based on which we can proceed to understand virtuality as a measurable construct that can be used across multiple organizational contexts (Shekhar, 2006).

Davenport and Pearlson purpose in 1998 did a research on Virtual Offices assessed what is gained and what is lost in substituting technology in a physical office to become more Virtual. This survey on Fortune 500 Companies showed that 29% of firms had alternative work arrangements on a formal basis and 71% had not any formal programs in this regards. Within firms adopting virtual work, as many as 10 percent of workers may be mobile at some time (Davenport & Pearlson, 1998).

1.1.1. Virtuality

To have more clear vision of VOs first the concept of Virtuality must be closely analyzed because there are numerous perspectives from which it has been studied. Virtuality is manifested through the level of dependence of an organization on cyberspace or its ICT infrastructure for completing its organizational activities.

Hence a measure of the extent of this virtual facilitation would be a measure of the degree of virtuality of an organization (shekhar, 2006). Also researchers have pointed to the concept of cyberspace being central to an understanding of virtuality, and it has been variously

referred to as cybernization, information and communication technology (ICT) dependence, and IT focus (Travica, 1997; Townsend et al., 2002; Palmer & Speier, 1997; Katzy, 1998).

Travica in his research in 2005 created a clear model called ISSAAC (read as "Isaac") that accounts both for degree of virtuality and for the VO characteristics. The model is supposed to be used as a vehicle for explaining VO and for assessing the degree of virtualness. ISSAAC dimensions are conceptualized as follows.

- ***Cybernization*** *(Key Role)***:** refers to an organization's existing in the space that is created by information systems and electronic information flows (cyber space or electronic space). Cybernization reflects the necessary role of IT in VO, accounting for both the extent of IT usage and the involvement of an organization in creating and using computer networks, EDI, technologies for B2B e-commerce, and various relevant information systems.

- ***Aggregation*****:** refers to networking electronically with other organizations and individuals to form a VO. This dimension reflects the electronic network (or networking) character of VO. The term aggregation is intended to connote a typically looser coupling that is expected to exist in a VO.

- ***Switching*****:** refers to the extent to which an organization alternates its membership in VOs over a period of time. This dimension depends importantly on flexible boundaries and electronic linking. Also, Switching is related to the dynamics and scope of Aggregation, and it may be important for delivering non-standard products. Switching helps differentiating between VO and the network organization, as it is not typical for the latter.

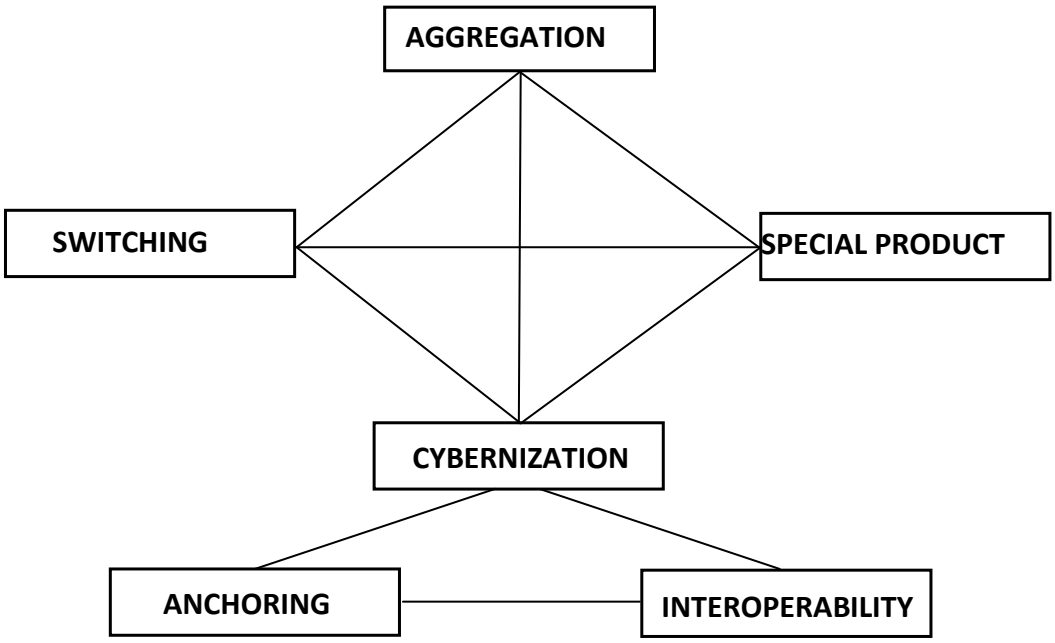


Figure 2, the ISSAAC Model of Virtual Organization

- ***Anchoring*****:** refers to the support that Cybernization meets in the management, structural, process, cultural, political, and strategic aspects of an organization. Existing in the cyber

space through information systems and networks needs to be anchored in the organization of work, management methods, organizational values, etc.

- ***Interoperability*:** refers to the extent to which an organization is synchronized with its partners in a VO. Synchronizing means that members of VO need to be capable of both communicating with each other and working together. Interoperability resembles coordination, but it is different in implying that a more flexible coupling exists among the constituent parts. Interoperability may vary by markets.

- ***Special Product*:** refers to the extent to which an organization delivers non-standard products (goods and services). This dimension reflects the end purpose of a VO; sharing competences and resources could, then, be understood as intermediary goals.

Beside ISSAAC, Shekhar in her 2006 analysis created a model to show directionality and granularity of virtuality .Shekhar believes that Virtuality can manifest itself in different ways. These could include:

1. Outsourcing and off-shoring (Zineldin & Bredenlow, 2003)
2. Virtual linkages with supply chain and other partners (Weber, 2002)
3. Electronic market places (Travica, 2005)
4. E-learning (Englehardt & Simmons, 2002)
5. Virtual communities (Dube et al., 2005)
6. Tele-work (Verano Tacoronte et al., 2003)
7. Virtual teams (Gibson and Cohen, 2003)
8. Technology-facilitated customer management activities (Neuborne, 2003).

Her analysis of the major manifestations points to the fact that these can be aligned along any one of three directions:

1. The external customer (EC) direction, which would include virtuality with respect to all customer categories;
2. The internal customer (IC) direction, which would include virtuality with respect to employees and other individuals within the organization;
3. The value chain (VC) partner direction that would include inter-organizational linkages with suppliers, alliance partners, subsidiaries, service providers, and so on.

Figure 3 provides a pictorial view of the combined representation of the direction and granularity. When viewed in this manner, it becomes easy to depict the various VO manifestations.

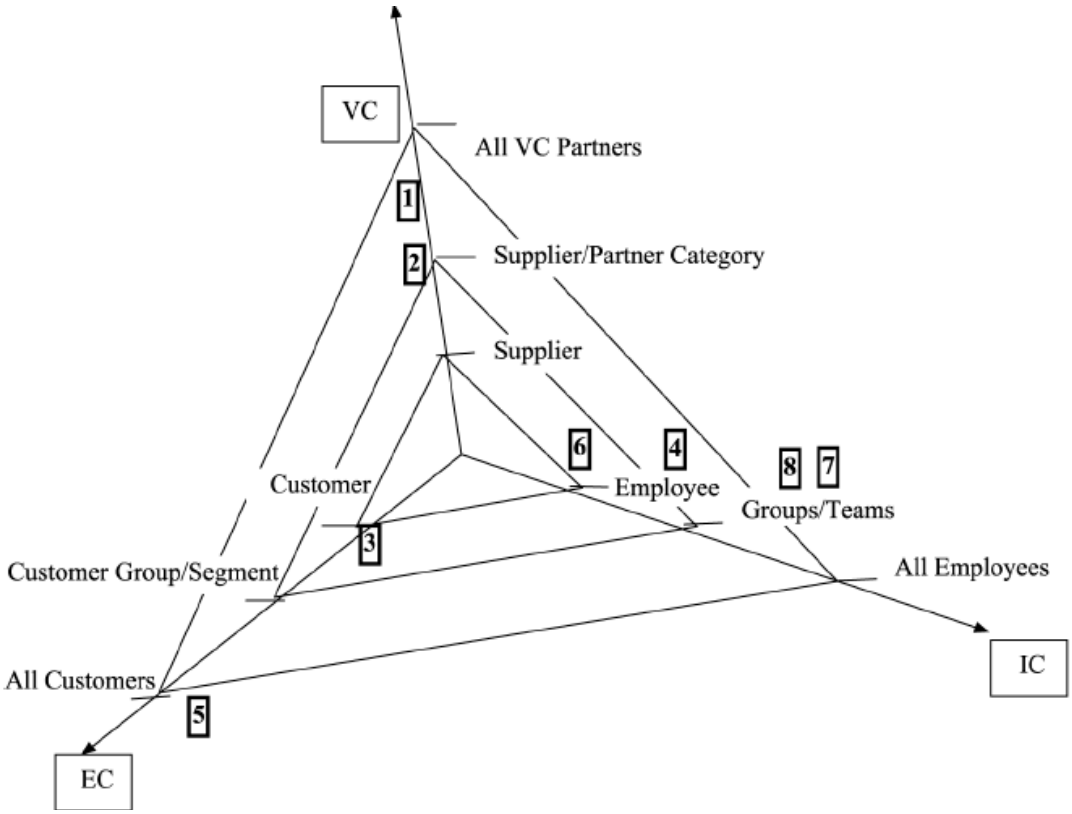


Figure 3 : Directionality and granularity of virtuality (shekhar, 2006)

The numbers within the boxes in the figure depict some of the VO manifestations. These numbers also show how such a representation makes it easy to depict, understand and analyze them.

Besides this models Venkatraman and Henderson (1998), suggested an architecture for the VO along the three vectors of customer interaction, knowledge leverage and asset configuration, which it needs to progress. Venkatraman and Henderson (1998), reject a virtual organization as a distinct structure (like functional, divisional or matrix). Instead, they treated virtualness as a strategic characteristic applicable to every organization even is applicable to century-old companies that manufacture cement, chemicals, and autos as well as to new entrants in the fast-changing high-technology marketplace. They considered virtualness as a strategy that reflects three distinct yet interdependent vectors:

- *The customer interaction vector (virtual encounter)* deals with the new challenges and opportunities for company to customer interactions. IT now allows customers to remotely experience products and services, actively participate in dynamic customization, and create mutually reinforcing customer communities.
- *The asset configuration vector (virtual sourcing)* focuses on firm's requirements to be virtually integrated in a business network. Firms using the Internet for business-to-business transactions can structure and manage a dynamic portfolio of relationships to assemble and coordinate the required assets for delivering value to customers.

- *The knowledge leverage vector (virtual expertise)* is concerned with the opportunities for leveraging diverse sources of expertise within and across organizational boundaries. IT now enables knowledge and expertise to become drivers of value creation and organizational effectiveness.

Loosely these can be mapped to the three primary stakeholder directions identified above. The EC direction can be studied with reference to a single customer, customer segment/groups or all customers. Likewise the VC direction can be studied with respect to, a single supplier, supplier category or all value chain partners. Such a representation recognizes the fact that virtuality as a construct is not necessarily relevant only to the organization as a single entity. It is as relevant to an employee or a project team within an organization as it is to the organization or indeed the meta-organization (extended organization).

This is clear that no one vector adequately captures the potential opportunities of virtual organizing; their interdependence creates the new business model. Virtuality as a strategic approach is singularly focused on creating, nurturing, and deploying key intellectual and knowledge assets while sourcing tangible, physical assets in a complex network of relationships.

Venkatraman and Henderson (1998) also emphasized that each vector has three distinct stages:

1. Stage one focuses on the task units (such as customer service, purchasing, or new product development).
2. Stage two focuses at the organizational level on how to coordinate activities to create superior economic value.
3. The third stage focuses on the inter-organizational network to design and leverage multiple interdependent communities for innovation and growth. (Venkatraman N, Henderson J 1998)

Vectors and Characteristics	Stage 1	Stage 2	Stage 3
Customer interaction (virtual encounter)	Remote experience of products and services	Dynamic customization	Customer communities
Asset configuration (virtual sourcing)	Sourcing modules	Process interdependence	Resource coalitions
Knowledge leverage (virtual expertise)	Work-unit expertise	Corporate asset	Professional community expertise
Target Locus	Task Units	Organization	Inter-Organization
Performance Objectives	Improved operating efficiency (ROI)	Enhanced economic value added (EVA)	Sustained innovation and growth

Figure 4 : Virtual organizing, three vectors and three stages (Venkatraman and Henderson, 1998)

1.1.2. VO's Characteristics

In VO literature, there are many researchers who believe that VO exhibits a network character (Byrne, 1993; Child & Faulkner, 1998; Ching et al., 1996; DeSanctis et al., 1999; Goldman et al., 1995; Hedberg, 1997; Davidow & Malone, 1992; Snow et al., 1999; Venkatraman and Henderson, 1998). Byrne (1993) defined VO as a temporary network of suppliers, customers, and rivals. Using Powel's (1990) concept of hybrid organizational designs that inherit characteristics of both market and hierarchy, the authors have posited that VO may evolve from network forms, which are closer to the market end of the continuum to the equal-partner network and the dominated network. Child & Faulkner believe that VO shares advantages of the network organization, most notably access to other's resources and skills, provision of information and business intelligence, reduction of uncertainty, increase of speed, and provision of resource allocation flexibility (Child & Faulkner, 1998).

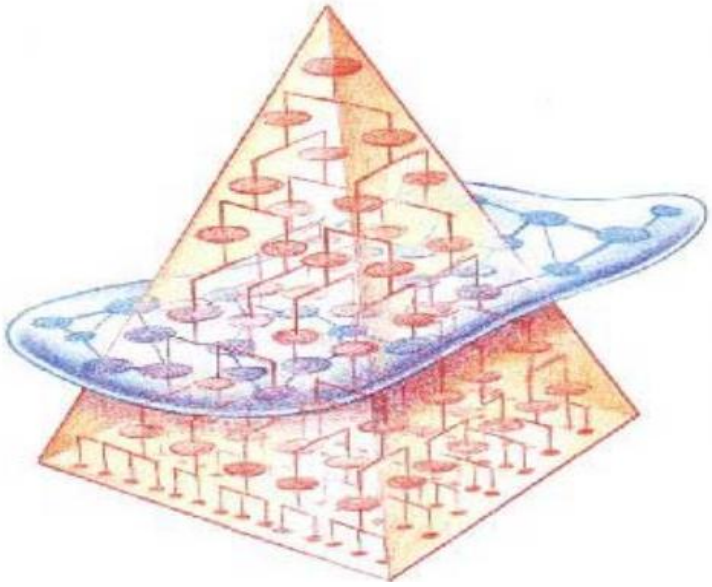


Figure 5: A graphic schema of a Hybrid Organization

In year 2002, Larsen and McInerney, analyzed and explained other aspect of a VO characteristic:

1. **Customer-based and mass customization:** This characteristic refers to the ability to customize the product or services to the customer. (Gilmore & Pine ,1997) suggest four levels of customerization based on whether the product had been changed or not, and whether the representation had been changed or not.

2. **Network of independent organizations**: virtual organizations are often considered a subject of the much older research area of networked organizations (Jagers, Jason, Steenbakkers, 1998). A network refers to a set of people or organizations that are tied by relational, positional or spatial proximity (Rice, 1993). For virtual organizations, focus is usually on networks that are created or controlled by technological means, and thus positional and spatial proximity is not considered important.

3. **Semi-stable relations:** the literature disagrees about temporal nature of virtual organizations; however, most researchers seem to agree that the virtual organization is a temporary structure (Larsen, 1999).

4. **Geographical dispersion**: the geographical dispersion of organizations may be one of the main differences between a virtual organization and other type of partnerships. Whereas other types of partnerships rely on co-locating staff, VOs avoid this by using information technology.

5. **Based on core competencies**: most organizations, naturally, have areas where they have higher quality competencies as well as areas where they have lower quality competencies. The thinking behind virtual organizations is that several organizations should pool their talents, with each organization contributing their high quality competencies.

6. **Dependent on innovation**: some researchers see virtual organizations as a response to opportunities arise; virtual organizations are created quickly to take advantages of the opportunities by creating unique and innovative solutions.

7. **Based on teamwork**: teams, the building blocks of a virtual organization have received much attention from researchers. Even so, many aspects of their dynamics continue to elude researchers. This is especially true for teams basing their communication on technology.

8. **Partial mission overlap**: partial mission overlap suggests that the VO partners are also doing business outside the context of the VO. Partners that are doing business only within the context of the VO would have full mission overlap (Larsen & McInerney, 2002)

Also in the literature the "Virtual Enterprise" described as temporary consortiums of independent member companies who come together to exploit a particular market opportunity (Nikoleris & Johansson ,2003) but altogether The VE concept is defined somewhat differently, and it needs more advanced inter organizational information technology. They operate as nodes in a network of suppliers, customers, engineers, and other specialized service functions (Davidow & Malone, 1995).

The main objective of a VE is to allow a number of organizations to rapidly develop a common working environment; hence managing a collection of resources provided by the participating organizations toward the attainment of some common goals. Because each partner brings a strength or core competence to the consortium, the success of the project depends on all co-operating as a single unit (Martinez, Fouletier, Park, Favrel, 2001).

Travica in a research in 2005, pointed out that differences in conceptualizing VO are extant in the literature and that reductionism is not rare (e.g., equating VO with spatially distributed organization). Another emblematic characteristic of the literature is inconclusive evidence on the role of IT in VO. This fact precipitates the proposition that IT is a necessary but not sufficient condition for VO (Travica, 2005). Travica also summarize some of the characteristics of a VO as Table below:

VO Characteristic	Description
1. VO is the interorganizational effect	VO results from interaction of VO members, creating a supra-organizational entity. In this respect, VO is intangible.
2. Virtualness is a property of organization	Virtualness of processes is a matter of scale and it can occur on the front/back end of an organization, and in the production core. In this respect, VO is tangible.
3. Multiplication Effect	The same organization can be involved in different VOs simultaneously (processes virtualized on the back end and in the production core can create different VOs).
4. Unifying Effect	Different organizations create a virtual interorganizational arrangement, thus posing as one organization.
5. Different domains of virtualizing create different VO forms	- Either as the interorganizational effect or organizational property, VO can take place at the front and back end of organizations, and in the production core. - The front/back-end virtualizing refers to supply chains, including e-markets, materializing in the virtual corporation form. - The production core virtualizing refers to virtual alliances and virtual interorganizational teams.
6. Network Character	This characteristic indicates a similarity between VO and the network organization. In contrast to its counterpart, coupling in VO is looser and electronic links are necessary (but not sufficient).
7. IT is a necessary but not sufficient condition	- IT is used for electronic networking and in various processes as an enabler complementing social conditions. - This characteristic differentiates between VO and the network organization.
8. Dynamic, Switchable membership	- VO members can change from project to project and even on the task basis. - This characteristic is a consequence of looser coupling and it helps differentiate between VO and the network organization.
9. Flexible Boundaries	- Permeable/fuzzy boundaries allow for forming supra-organizational forms. - This characteristic helps differentiate between VO and the network organization.
10. Spatial Dispersion	- This is a common characteristic of VO as the supra-organizational form. - Every dispersed organization is not VO; additional conditions/characteristics are needed for VO to exist.
11. Variable Longevity	Different virtual forms have different life spans (e.g., virtual alliance based on long-term marketing strategy vs. virtual corporation defined by project time).
12. Non-standard product	- This is an umbrella term for product that is customized, innovative, quick, niche, and it expresses the end-goal of VO.

Table 2: Characteristics of Virtual Organization (Trivia, 2005)

Besides looking at a VO from the top, having a closer look would be interesting. This close perspective will explore more about inside of a VO and its different characteristics. Kaboli et al., 2006, explained that VOs got different characteristic based on the scope of the work, the projected length of time spent in virtual work, types of projects, the range of involvement and the number of personnel involved. These criteria suggested four distinct virtual organizational types:

1. **Permanent virtual organizations:** This virtual organization was designed, from its inception, as a virtual organization to bring together market players and respond to opportunities for both improve revenue-generating activities as well as cost savings. This

is a model which involves the virtual concept in all operations, including virtual tasks, teams, and management of the organization's activities.

2. **Virtual teams:** Internal organizational use of the virtual concept has generated virtual teams in a variety of organizations. In most cases these teams come from a specific functional, process or strategic business unit within a larger organization. The organizational use of the virtual concept in this instance is in virtual tasks and virtual teams.

3. **Virtual projects:** A third incarnation of the virtual organization is the virtual project. In this design, organizations form alliances or consortia to bring complementary organizations together in meeting market opportunities. Alliances formed call on manufacturers, developers, and markets from a variety of organizations to respond more effectively to market opportunities. and

4. **Temporary virtual organizations:** An extension of the virtual project design is to establish a temporary virtual organization to take on multiple projects and develop responses to a specific market opportunity. When the market opportunity has ended, so has the organization. This is the initial virtual organizational model (Goldman. 1998; Davidow & Malone, 1992) virtual tasks, teams, operation, and virtual management of the organization's activities (Kaboli, Tabari & Kaboli, 2006).

Kaboli et al in their 2006 research made a table for Virtual Organization Types Comparison on Multiple Dimensions as below:

	Virtual Teams	Virtual Projects	Temporary VO	Permanent VO
Range of Involvement	Internal of an organizational function or departmental unit	Across functions and organizations	Across organization	Across organization
Membership	Small, local	Indeterminate	Typically larger	Typically smaller but scalable
Mission	Teams on specific, ongoing tasks	Multiple Organizational representatives working on specific projects	Multiple functions responding to a market opportunity	All functions and full functionality as a working organization
Length of project	Membership varies ,but form is permanent	Temporary	Temporary	permanent
Uses of IT	Connectivity sharing embedded knowledge (email groupware)	Repository of shared data (databases, groupware)	Shared infrastructure (groupware, WANs, remote computing)	Channel for marketing and distribution, replacing physical infrastructure(web, Intranet)

Table3 : Virtual Organization Types, comparison on multiple dimensions, (Kaboli at al., 2006)

In order to have a clear image of VO characteristic, we need to consider a third perspective which is its business functions. Davenport and Pearlson in 1998 found that most common Business Functions for Virtual Work in order of popularity are:

- Field sales and service
- Technical support staff functions (MIS, human resources, procurement, legal)
- Product development, engineering, and research

- General management.
- Managing Facilities

And all the companies in which they conducted interviews have used information technology in creative ways to establish alternative work arrangements. It should come as no surprise that advances in information technology have helped fuel the increasing interest in virtual offices (Devenport & Pearlson, 1998).

The last perspective, is to look at a VO as a corporation .There are number of researchers based on the conceptualization of VO on processes and structures of sourcing, outsourcing, and supply chain. This assumption is the foundation of virtual corporation (Kraut et al., 1998; Upton & McAfee, 1996; Venkatraman & Henderson; 1998). Figure below presents main aspects of the virtual corporation extrapolated from the literature.

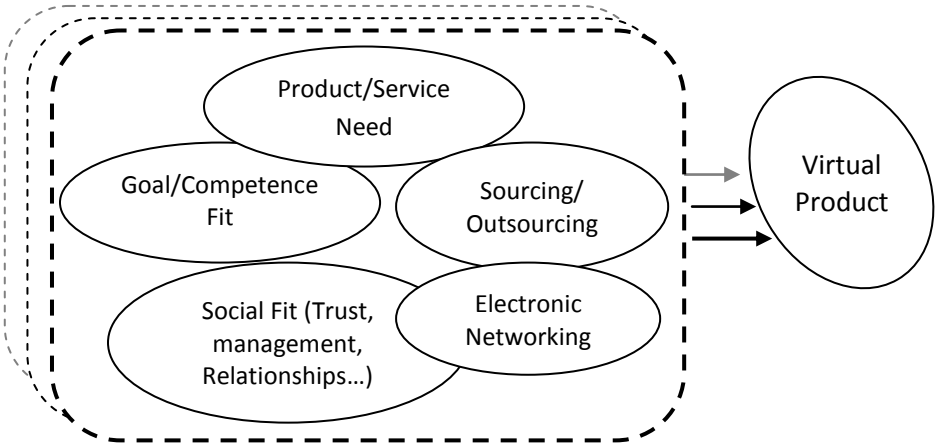


Figure 6: VO as a Virtual Corporation

True to the letter of literature, this model of virtual corporation doesn't indicate relationships between dimensions as it is customary in quantitative modeling. An instance of rare clarity in modeling was provided by Kraut and associates (1988). They established a causal relationship between electronic networking and social networking, as the antecedents on the one side, and outsourcing, as the consequence on the other side. The extent of outsourcing was conceived as the measure of "Virtualization." The authors found that the social dimension predicted outsourcing better than the technological one. Based on models mentioned in this section and literature analysis here we are going to discus about each of the aspects of a VO.

1.1.3. Virtual Teams

Different articles indicated that teams are the primary unit of performance in any organization. A team is small number of people with complementary skills who are committed to a common purpose, common performance goals, and an approach for which they hold themselves mutually accountable (Katzenbach & Smith, 1994). The team approach to managing organization is having a diverse and substantial impact on organizations and individuals (Barner, 1996). Teams promise to be a cornerstone of progressive management for the foreseeable future. According to the management expert Peter Drucker in 1998,

tomorrow's organizations will be flatter, information based, and organized around teams. (Drucker, 1998)

The history of organization and workforce lead us to the fact that the usage of work teams has increased over the past years. Work teams are a group of employees that works semi autonomously on recurring tasks. Work teams are most useful where job content changes frequently and employees with limited skills and a specific set of duties are unable to cope. Nowadays many organizations have shifted from hierarchical structures to more flexible ones, thus empowering lower level employees and allowing better utilization of distributed knowledge resources (Cooney 2004).

Different authors also have identified diverse perspective to look at VTs. From the perspective of Leenders et al. (Leenders, Engelen & Kratzer, 2003) virtual teams are groups of individuals collaborating in the execution of a specific project while geographically and often temporally distributed, possibly anywhere within (and beyond) their parent organizations. And one of the other most accepted one: (Powell, Piccoli, & Ives, 2004), 'virtual teams are as groups of geographically, organizationally and/or time dispersed workers brought together by information technologies to accomplish one or more organization tasks'.

In this thesis we accepted the most referred definition, which belongs to Ale Ebrahim and al in 2009. "Small temporary groups of geographically, organizationally and/or time dispersed knowledge workers who coordinate their work predominantly with electronic information and communication technologies in order to accomplish one or more organization tasks". (Ale Ebrahim, Ahmed, Taha, 2009). The important point in these researchers was that they emphasized on Knowledge workers as members of this team more than before.

But who is a knowledge worker? A knowledge worker is anyone who works for a living at the tasks of developing or using knowledge. For example people who do planning, acquiring, searching, analyzing, organizing, storing, programming, distributing, marketing, etc. using the knowledge. This term first used by Peter Drucker in his 1959 book, Landmarks of Tomorrow, the knowledge worker includes those in the information technology fields, such as programmers, systems analysts, technical writers, academic professionals, researchers, and so forth.(Drucker, 1959)

What these definitions have in common is that VTs are teams of people who primarily interact electronically and who may meet face-to-face occasionally. (Powell et al., 2004) in simple terms, then;

Virtual teams = teams + electronic links + groupware.

In terms of human elements VTs are more complex than working face-to-face (Heimer & Vince, 1998). Site specific cultures and lack of familiarity are reported to be sources of conflict (Hinds & Bailey, 2003). Vakola and Wilson (2004) warn that the importance of the human element and the way that people co-operate with each other should not be taken for granted (Vakola & Wilson, 2004). But the increased employment of virtual teams is in part

due to readily available collaboration technologies, the increased use of alternative work arrangements (Gajendran & Harrison 2007) and the many potential benefits they can offer. These include stronger team-member participation (Townsend et al. 1998), reduced travel and collaboration costs, accelerated decision processes and increased sales (May & Carter 2001).

Considering the literature of Virtual Teams and definitions that they proposed we can summarize major characteristics of a VT as below:

Characteristic	Some of the recent References
Geographically dispersed over different time zones	Lee-Kelley & Sankey, 2008 / Wong & Burton, 2000 Dafoulas & Macaulay, 2002 / Peters & Manz, 2007
Driven by common purpose guided by a common purpose	Bal & Teo, 2001 / Gassmann & Von Zedtwitz, 2003 Shin, 2005 / Hertel, Geister & Konradt ,2005 Rezgui,2007
Enabled by communication technologies	Bal & Teo, 2001 / Lee-Kelley & Sankey, 2008 Nemiro, 2002 / Peters & Manz, 2007
Involved in cross-boundary collaboration	Bal & Teo, 2001 / Gassmann & Von Zedtwitz, 2003 Rezgui, 2007 / Precup et al. 2006
It is not a permanent team	Bal & Teo, 2001 / Paul et al. 2005 Wong & Burton, 2000 / Cascio & Shurygailo,2003 Leenders, Engelen & Kratzer, 2003
Small team size	Bal & Teo, 2001
Team member are knowledge workers	Bal & Teo, 2001 / Kirkman et al. 2004
Team members may belong to different companies	Dafoulas & Macaulay ,2002 Leenders, Engelen & Kratzer,2003

Table 4 : VT's major characteristics

Besides table 4, literature analysis showed that researchers have emphasized on the task dimensional factors of a VT. For example, Bordia (1997) and Lipnack & Stamps (2000) have found that group members within virtual teams tend to be more task-oriented because of the constraints imposed by computer mediated communication (CMC). In general, periodic face-to-face (FTF) meetings may improve project progress. However, if FTF meetings are not feasible, communicating and exchanging information through CMC typically improves the coordination of virtual teams (Massey, Montoya-Weiss & Hung, 2002). Task-technology-structure fit, another task dimensional factor, evaluates the fit between task, technology, and structure. It determines the tasks suitable for various technologies and structures as well as the technology (Lu, Watson-Manheim, Chudoba &Wynn, 2006).

There are too many challenges for Virtual teams because they live trough computer mediated communication technology rather than face-to-face interaction (Gaudes et al., 2007). Sometimes they report to different supervisors and they function as empowered professionals who are expected to use their initiative and resources to contribute to accomplishment of the team goal (Hunsaker & Hunsaker, 2008)

There is one more component of a Virtual organization that need to be discussed here .One of the main duties of a VT is to get a task done! When a task is so big team managers or VO

leader must decomposition it into couple of small task that needs to be done by other different VTs. Martinez et al. beloved that for task decomposition, an open and rational approach is needed (Martinez, Fouletier & park, 2001). An analysis method based on product functions is proposed. The product is first decomposed according to its functions, see Figure below.

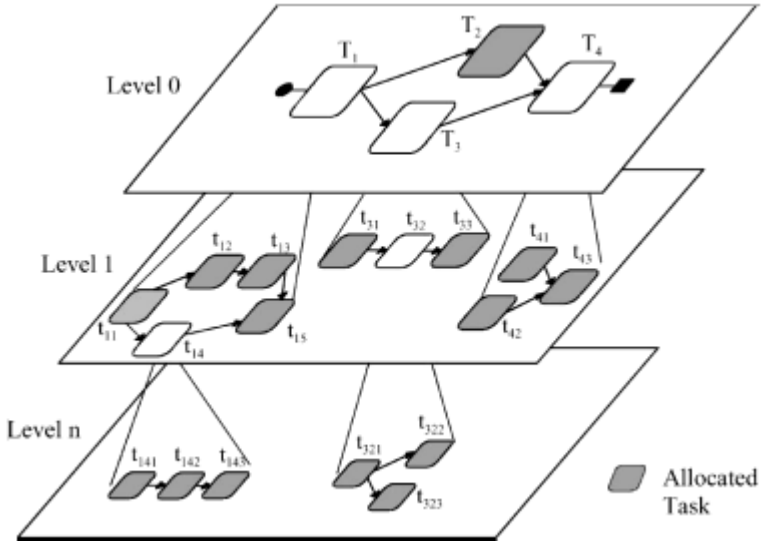


Figure 7 : Levels of task decomposition

At this stage the product technologies and design are selected. The processes necessary to develop the product and their costs are then deduced. In the last step of this pre-study, the processes of a same type can be regrouped or reorganized according to manufacturing activities or manufacturing businesses. Successive process decomposition is sometimes needed to determine a set of tasks in which every task can be assigned entirely to a single VT. To be efficient, this process is not homogeneous. A task assignable to a responsible firm is no longer decomposed; see Figure below (Martinez, Fouletier, park, 2001).

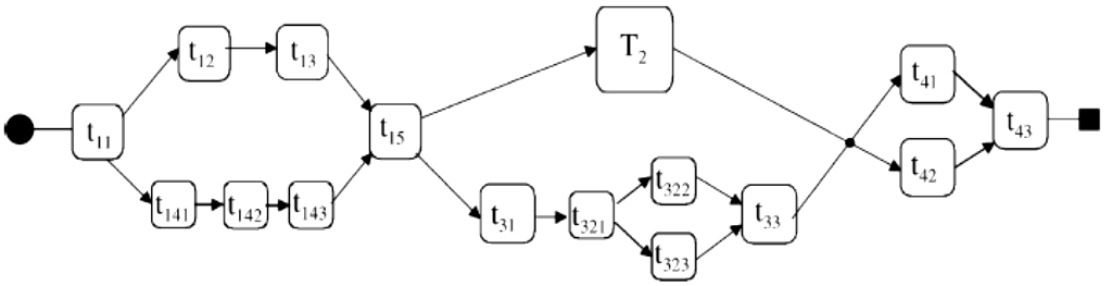


Figure 8 : Task allocation graph

1.1.3.1. Traditional teams VS Virtual Teams TT

Unlike a traditional team (TT), a virtual team (VT) works are across space, time and organizational boundaries with links strengthened by webs of communication technologies. However, many of the best practices for traditional teams are similar to those for virtual teams (Bergiel, Bergiel & Balsmeier, 2008) but VTs are significantly different from TTs. As

shown in Figure below, in the traditional team the members work next to one another, while in virtual teams they work in different locations a possibly different time zone.

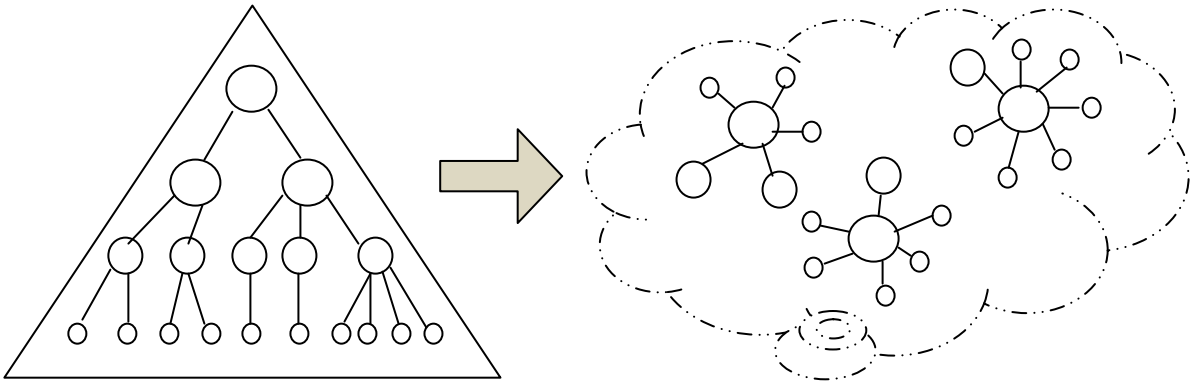


Figure 9 : From Traditional to Virtual teams

In traditional teams the coordination of tasks is straightforward and performed by the members of the team together; in virtual teams, in contrast, tasks must be much more highly structured. Also, virtual teams rely on electronic communication, as opposed to face-to-face communication in traditional teams.

Diversity in national background and culture is common in transnational and virtual teams (Staples & Zhao, 2006). In other hand in Virtual teams reliance on computer-mediated communication makes VTs unique from traditional ones (Munkvold & Zigurs, 2007). The processes used by successful virtual teams will be different from those used in face-to-face collaborations (FFCs) (Park & Hwang, 2003).

Activity	Physical teams nature	Virtual teams nature
Nature of interaction	Opportunity to share work and non- work related information	the extent of informal exchange of information is minimal
Utilization of resources	Increases the opportunity for allocation and sharing of resources	each collaborating body will have to have access to similar technical and non- technical infrastructure
Control and accountability (over and within the project)	The project manager provides the context for ongoing monitoring of activities and events and thus enhances their ability to respond to requirements.	The collaborating bodies are accountable to the task leaders and the project coordinator who had limited authority to enforce any penalties for failure to achieve their tasks
Working environment	They encountered constraints accessing information and interacting with others outside the collocated team within the company	Sometimes not able to share ideas or dilemmas with other partners.
Cultural and educational background	members of the team are likely to have similar and complementary cultural and educational background	the team members varied in their education, culture, language, time orientation and expertise

Table5 : Classifying collocated teams vs. virtual teams (Pawar& Sharifi, 1997).

In the Literature of VO and VT there is a debate that the only way that VTs and TTs can be compared is to consider them to be a full Traditional or Full Virtual teams. Pawar and Sharifi

(Pawar & Sharifi, 1997) studied real VTs in an organizational setting versus collocated team success and classified physical teams versus virtual teams in six categories based on their specific activity and table above summarizes these differences.

Comparison between virtual and traditional teams has focused on the implication of virtual team's inability to meet face-to-face, and their reliance on electronic communication media (Powell et al., 2004). More specifically, much existing research has largely focused on a particular type of team: short-term student teams (Jarvenpaa & Leidner, 1999; Warkentin & Beranek, 1999; Tan et al., 2000; Crampton, 2001; Sarker et al., 2001) and assumes that a group or a team is engaged in only one task (Easley et al., 2003), which often leads to distortions such as activities not directly related to tasks being considered a sign of inefficiency.

Rezgui, (Rezgui,2007) mentioned that virtual teams research to date has not questioned the applicability of traditional team process views to the virtual environment, and has provided little formalization of working procedures and managerial structures. Rather, research has for the most part studied how these self-directed teams have addressed team coordination problems. This is also have been demonstrated in the Table 4 that Virtual teams are more self directed that traditional teams which has contradiction with formal structures of a TT. Tong & Yang in their 2013 research compared VTs with conventional teams (TT) at different stages of a team's lifecycle (Table below).

Stage	Characteristics	Unique Features of VTs	Unique Features of conventional teams
Team initiation and formation	Objective	Focus more on fulfilling employees' personal interests regarding grassroots issues	Focus more on managing assigned tasks
	Nature of task	Often beyond basic work duties, on an ad hoc basis, of short duration, or facing demanding deadlines	Often within routine work duties
	Member search	Apply additional online tools, such as social networks or online communities	Based on manager's knowledge
	Member selection criteria	In addition to seeking members with professional capabilities and team spirit, selection is based on member's interests, responsibility, and communication	Professional capabilities and team spirit
Task execution and monitoring	Regulation and control	Initiator is unable to formally control the team; sometimes other members can undertake management and coordinator roles	Project leader controls and monitors the team's progress
	Leadership and followership	Initiator can be the leader but other members have more opportunities to participate in VT management and decision making	Leadership with authority, and team members should follow the leader throughout the collaboration
	Task communication	Offline and online communication tools (dominant)	Offline and online communication tools
Task completion and evaluation	Task performance	Assessed by both management and team members	Assessed by management or clients
	Impacts on future work	Accumulate experience for future work and assist in recognizing future potential collaborators	Accumulate experience for future work

Figure 10 : Comparison between VTs and conventional teams in their life cycle

As shown in table, VTs exhibit more signs of innovativeness, flexibility, and democracy and tend to be more technologically savvy. However, the advantages of VTs can only be realized when organizations and team members appropriately manage the unique difficulties associated with this team structure. (Tong & Yang, 2013)

1.1.3.2. Types of virtual teams

There are different kinds of perspective to categorize virtual teams. One of most common perspective is the level of virtuality. Ale Ebrahim, et al. (2009) differentiated various forms of virtual teams in literature depending on the number of persons involved and the degree of interaction between them:

- *Telework:* (telecommuting) which is done partially or completely outside of the main company workplace with the aid of information and telecommunication services (Hertel, et al., 2005).
- *Virtual groups:* when several teleworkers are combined and each member reports to the same manager.
- *Virtual team:* exist when the members of a virtual group interact with each other in order to accomplish common goals.
- *Virtual communities*: are larger entities of distributed work in which members participate via the internet, guided by common purposes, roles and norms.(Ale Ebrahim, et al., 2009)

Cascio and Shurygailo (2003) have also clarified the different form of virtual team by classifying it with respect to two primary variables namely; the number of location (one or more) and the number of managers (one or more).

Managers / Locations	One	Multiple
One	Teleworkers	Matrixed Teleworkers
Multiple	Remote Team	Matrixed Remote Teams

Table 6 : Forms of Virtual Teams (Cascio & Shurygailo, 2003)

Beside these two, Durate and Snyder in their book (Duarte & Snyder, 1995) categorized virtual teams in terms of many different configurations:

1. **Networked teams** Consist of individuals who collaborate to achieve a common goal or purpose, Membership is frequently diffuse and fluid. The networked team is different from a project team in that the membership is not always clearly delineated from the rest of the organization and a final product is not always clearly defined and can often be a recommendation.

2. **Parallel teams** are becoming a fairly common way for multinational and global organizations to make recommendations about worldwide process and systems that take into account a global perspective. Also, Work in short term to develop recommendations for an Improvement in a process or system; has a distinct membership.

3. **Product-development teams** Conduct projects for users or customers for a time criterieum. Tasks are usually no routine, and the results are specific and measurable; team has decision making authority, self-directed or under a manager's supervision/ authority.

4. **Work or production teams** perform regular and ongoing work usually in one function; clearly defined membership.

5. **Service teams** support customers or the internal organization in typically a service/ technical support role around the clock. An example of a virtual service team is a customer support center that has operations in strategic locations across the globe to take advantage of a "follow the sun" strategy.

6. **Management teams** Work collaboratively on a daily basis within a functional division of a corporation.

7. **Action teams** offer immediate responses activated in (typically) emergency situations. They can cross distance and organizational boundaries. They are different from all of the other types of teams in that they are usually formed only to meet a specific and urgent need.

8. **Offshore ISD Teams**, Many companies subcontract or outsource portions of their software development work to a low-cost global location like India, Philippines etc. The team based out of this low-cost location is called offshore team which coordinates and collaborates with onshore team i.e. the main team of the company to deliver results. This model is applicable to software development and outsourcing organizations.

Before moving to characteristics of such teamwork we will summarize what we mentioned in last 3 sections about a VT and add a new structure to it.

There is still a fear about VTs and the fact that they are not as effective as traditional teams where everyone is located in the same place. According to the categorization we explained there are various kinds of VTs that created in a way to do some of the very serious duties. So it is suggestible that VTs can match or exceed the performance of other teams for some tasks. And also they provide an advantage in some areas.

Although everyday's face to face interaction is not possible in a VT but this type of communication is not always the most effective approach. When there are cultural or personal differences electronic communication may be more effective. In all the categories that got mentioned above there is more than one difference, the team's dynamics are different. Research has shown that VT's develop differently than co-located teams and therefore have different dynamics.

There is a myth about VTs that because accountability should be based on measurable outcomes so VTs are not accountable! But as it is pretty much clear in last pages shifting to a results oriented paradigm does not have anything in opposite to having a virtual team and being out-of-sight does not mean unaccountable but they are responsible to do much important stuff.

While ICT is a fundamental concept in building a VT, this may sometimes interpreted as weakness for VTs and if things go wrong it's because of technology. But Virtual teams fail more often due to lack of "soft skills," not due to lack of technology skills or function. Virtual teams are using technology to enhance relationship building and speed team development.

And despite of all the differences that we saw in the Virtual teams VS Traditional Teams section, there is no big difference in between them in when it come to comparing roles. It could be only some differences in Leader and members' roles especially concerning disciplined interaction and communication. But as a united entity a VT can do whatever a TT is capable of.

Final categorization of Virtual teams is based on a team's level of dispersion (which is neither preordained nor fixed). It is an organizational design parameter that companies can set and adjust. To measure geographic distribution, a dispersion index must be taking into account with following factors:

1. Miles between team members
2. Time zone difference
3. Number of locations per team
4. Percentage of isolated team members
5. Unevenness of membership across sites.

On the other hand, dispersion potentially has substantial advantages. First, in order to accomplish increasingly complex activities such as research and development, companies tend to cluster their competencies in different centers of excellence, which are often scattered geographically although part of an international corporate network of operations. Managers can take advantage of this organizational structure by assembling employees from different locations in such networks to create a team that can optimally integrate the different pools of expertise to perform a particular task. (Eppinger & Chitkara, 2006)

Second, companies can take advantage of the increased heterogeneity that is inherent in the nature of dispersed teams. Virtual teams tend to incorporate higher levels of structural and demographic diversity than do collocate teams and both types of diversity can be highly beneficial? (Cummings, 2004) Structural diversity is a direct consequence of having team members from multiple locations associated with different business units and reporting to different managers. Such diversity can be highly valuable for teams, because it exposes members to heterogeneous sources of work experience, feedback and networking opportunities (Cummings, 2004). In addition, virtual team members are often diverse in nationality. Although such diversity may complicate team dynamics, it can also enhance the

overall problem-solving capacity of the group by bringing more vantage points to bear on a particular project. (Hambrick, Davison, Snell &Snow, 1998)

1.1.3.3. Benefits and pitfalls of virtual teams

Working in today‘s business world is like working in a world where the sun never sets. During the last decade, words such as virtual, virtualization, virtualized have been very often advocated by scholars and practitioners (Vaccaro, Veloso & Brusoni, 2008). However, the advantages and pitfalls of virtual teams are concealed. In other hand Virtual teams have several features that differentiate them from conventional teams. These dimensions cause many advantages and disadvantages (Bergiel et al., 2008) for organizations that deploy virtual teams to perform tasks.

Being aware of this advantages and pitfalls is one of the most important factors for Leaders, managers and staff of VO. Team managers should also be aware of such points in their teams to prevent any vulnerability, mistrust, managing conflict, and challenges of monitoring and control of activities. In 2 tables below you can find advantages and disadvantages of Virtual teams according to Ale Ebrahim, et al. in 2011.

Advantages	References
Reducing relocation time and costs (travel costs)	Cascio, 2000 / Lipnack & Stamps,2000 McDonough, Kahn, and Barczak ,2001
Reducing time-to-market, Time also has an almost 1:1 correlation with cost, so cost will likewise be reduced if the time-to market is quicker.	May & Carter ,2001 / Sorli et al., 2006 Kankanhalli, Tan & Wei, 2006 Prasad, Akhilesh ,2002 / Sridhar et al. ,2007 Lipnack & Stamps,2000 / Chen, 2008
Able to tap selectively into center of excellence, using the best talent regardless of location	Cascio, 2000 / Criscuolo, 2005 Fuller, Hardin & Davison, 2006 Prasad & Akhilesh ,2002 Boudreau, M.-C., et al, 1998 Boutellier, et al, 1998
Greater productivity, shorter development times	McDonough, Kahn & Barczak ,2001 Mulebeke & Zheng, 2006
Greater degree of freedom to individuals involved with the development project	Ojasalo, 2008
Higher degree of cohesion (Teams can be organized whether or not members are in proximity to one another)	Cascio, 2000 / Gaudes, et al. 2007 Kratzer, Leenders ,2005
Producing better outcomes and attract better employees	Martins, Gilson & Maynard, 2004 Rice et al, 2007
Provide organizations with unprecedented level of flexibility and responsiveness	Powell, Piccoli & Ives ,2004 Prasad & Akhilesh ,2002 Liu & Liu, 2007 / Chen, 2008 Hunsaker & Hunsaker, 2008 Piccoli, Powell & Ives, 2004
Respond quickly to changing business environments	Bergiel & Bergiel, 2008 Mulebeke & Zheng, 2006

Sharing knowledge and experiences easily	Rosen, Furst & Blackburn, 2007 Zakaria, Amelinckx & Wilemon, 2004
Enable organizations to respond faster to increased competition	Hunsaker& Hunsaker, 2008 / Pauleen, 2003
Better team outcomes (quality, productivity, and satisfaction)	Gaudes, et al. 2007 Ortiz de Guinea & Webster, 2005
Most effective in making decisions	Hossain & Wigand, 2004
Higher team effectiveness and efficiency	May & Carter ,2001 / Shachaf & Hara, 2005
Self-assessed performance and high performance.	Chudoba, et al.2005 Poehler & Schumacher, 2007
Cultivating and managing creativity	Leenders, Engelen & Kratzer,2003
Improve the detail and precision of design activities	Vaccaro, Veloso & Brusoni, 2008
Provide a vehicle for global collaboration and coordination of R&D-related activities	Paul et al., 2005
Availability of a flexible and configurable base infrastructure	Anderson, et al., 2007

Table7 : Some of the main Advantages associated with virtual teaming.

Pitfalls	References
lack of physical interaction	Cascio, 2000 / Rice et al. 2007 Kankanhalli, Tan & Wei, 2006 Hossain & Wigand, 2004
everything to be reinforced in a much more structured, formal process	Luray & Raisinghani, 2001
Challenges of project management are more related to the distance between team members than to their cultural or language differences	Martinez-Sanchez, et al. 2006
Challenges of determining the appropriate task technology fit	Qureshi & Vogel, 2001 Ocker & Fjermestad, 2008
Cultural and functional diversity in virtual teams lead to differences in the members' thought processes. Develop trust among the members are challenging	Kankanhalli, Tan & Wei, 2006 Poehler & Schumacher ,2007 Paul, et al, 2005
Create challenges and obstacles like technophobia (employees who are uncomfortable with computer and other telecommunications technologies)	Johnson, Heimann & O'Neill, 2001
Variety of practices (cultural and work process diversity) and employee mobility negatively impacted performance in virtual teams.	Chudoba, et al. ,2005
Team members need special training and encouragement	Ryssen & Godar, 2000
Coordinators have limited authority to enforce any penalties for failure to achieve their tasks	Pawar & Sharifi, 1997
Facing tight schedules and a need to start quickly and perform instantly	Munkvold & Zigurs, 2007

Table 8: Some of the main Disadvantages associated with virtual teaming.

According to these 2 tables, VTs have several advantages that have allowed them to grow in popularity, and disadvantages to be worried about. Here we are going to discuss some of the main points in 2 tables.

- **Reduction of travel time and cost:** the significant expenses associated with accommodation, travel and various daily allowances may be reduced and even eliminated as virtual teams communicate via technology. The reduction in face-to-face meeting time also reduces the level of disruption to every day office life (Opper and Fersko-Weiss, 1992).
- **Reduce time-to-market:** Lead Time or Time to market has been generally admitted to be one of the most important keys for success in manufacturing companies (Sorli, Stokic, Gorostiza, 2006, May & Carter, 2001). Virtual teams are effective in reducing time.
- **Recruit talented employees:** virtual teams allow all organizations to recruit the most talented employees in the field. According to Lipnack and Stamps (2000), today's workers are increasingly unwilling to move because it is a stressful and costly undertaking (Joinson, 2002). Therefore, if a company wants the talents of a ''top marketing guru who is comfortable settled in Elk, California'', a virtual team may be the solution. Virtual teams create a pool of talent that would be unavailable to a company if the management insisted on conducting business through face-to-face meetings only (Snyder, 2003).
- **The virtual structure may not fit the operational environment:** virtual teams may not be an appropriate tool for every company or organization. Joinson (2002) suggests that industries such as manufacturing may not be conducive to the use of virtual teams. He indicates that ''any type of work that's very sequential or integrated can pose problems for virtual teams.''
- **Lack of psychologically readiness to work entirely in a virtual space:** thus, virtual teams are not always seen as ideal for many employees. According to Joinson (2002), some people who are stimulated by interaction with other people or who need external structure to stay on track may be unsuccessful in a virtual environment. These employees thus require extensive training and support if they are to be engaged, even partially, as a member of a virtual team.

Besides this table, Dr.Davis Gould in 1997 suggested another perspective to look at the advantages of VTs:

- **Virtual teams get the job done**. Most of the teams achieved the goals set for them. In only one instance did a team fail to attain its goals, and this failure could not be connected to the fact that the team was a virtual team.
- **People can be trusted**. The question is the people you can't see can be trusted to do their work properly? The answer is clearly yes.
- **Few virtual teams are 100 percent virtual**. Virtual teams tend to have some face-to-face meetings. Results showed face-to-face contact was fairly unimportant in teams with relatively independent team members engaged in individual work projects. However, it was important in teams with interdependent members.

- **Virtual teams take on the same basic structure as "real" teams**. VTs have the same dynamics that researchers have discovered in "real" teams. The early stages are characterized by a certain amount of randomness, chaos, and ad hoc decision-making. As the team matures, processes are put into place and the team becomes more efficient (Gould, D., 1997).

Gibson and Cohen's (2006) research somehow summarized these several challenges that occur in virtual teams into Technology Failures, Communication Mishaps, Dysfunctional Conflict, Inefficient Work Processes, and Challenges to Support Systems. This is clear that these kind challenges can affect the productivity of a VO but there are ways to keep this kind of teams effective.

1.1.3.4. Effective Virtual Team

Researchers are making efforts to determine how virtuality impacts team effectiveness (Dube & Pare, 2001; Furst, Blackburn, & Rosen, 1999; Martins, Gilson & Maynard, 2004; Pauleen, 2003). Furst, Blackburn, and Rosen suggest that the lack of research on this area is partially a result of the newness of VTs and partially a result of the underlying assumption that the existing knowledge of traditional team effectiveness is applicable in the virtual environment. They proposed a research agenda on VT effectiveness based on Hackman's normative model (Furst, Blackburn, & Rosen, 1999).

Martins, Gilson, and Maynard (2004) recently reviewed the body of knowledge on virtual teams and suggest even more future research directions that focus on virtual teams' effectiveness. Most of these studies were conducted under the systems approach using Hackman's normative model (input-process-output) for traditional team effectiveness (Hackman & Oldham, 1980).

A survey, involved a questionnaire based on a framework for virtual team effectiveness developed by Lurey and Raisinghani (2001). The framework includes three main factors that are expected to have a direct effect on team effectiveness. These factors are:

- *Internal group dynamics:* job characteristics, selection procedure, team member relations, team process, internal team leadership
- *External support mechanisms:* education system, reward system; executive leadership style, tools and technologies, communication patterns
- *Design process*.

And, the outcome measures of effectiveness were performance and satisfaction (Lurey and Raisinghani, 2001). Shachaf and Hara in an article in 2005 proposed an ecological framework consists of three components that are critical to virtual team's effectiveness. Compared to Hackman's normative model (Hackman & Oldham, 1980), this framework is more holistic and emphasizes continuing dynamic process, disregarding chronological sequence. The components are reciprocal and interdependent among themselves (Figure below).

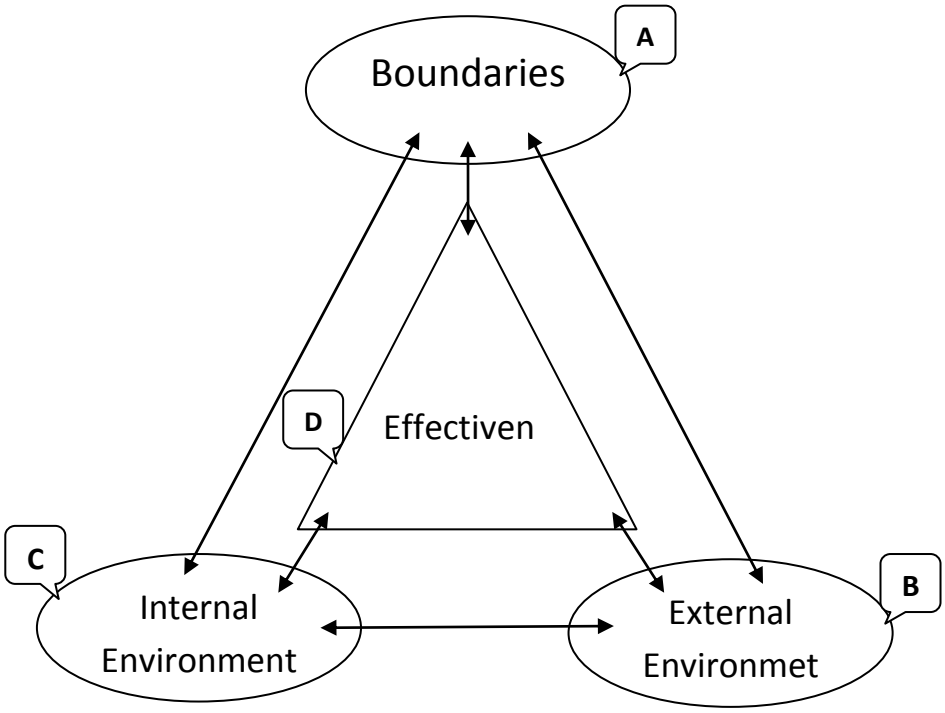


Figure 11: Ecological framework for virtual team effectiveness

A: VT creates and maintains permeable "virtual boundaries," which are not defined by functional or geographical aspects, but are instead based on a temporal task or project. The shared digital space creates and maintains boundaries. This shared digital space and the temporal physical collocation of team members help the team to. For example: Integration, Differentiation, and Creation of Team Identity

B: There are four levels of Virtual Team's external environment: Microsystems, Mesosytem, Exosystem, and Macrosystem, in which the VTs are embedded. A specific elaboration and emphasis of the components of Microsystems is necessary because these components are more critical success factors for VTs. These factors are geographical locus; temporal locus and duration; cultural context; technological infrastructure; organizational support mechanism; autonomy and control mechanism; and forces of participation.

C: In this part, several unique components of the internal environment in this framework described: IT use, Boundaries spanning, Team development, Conflict management, Communication, Norm Development, Trust, Commitment, Team composition and design. These factors were recognized by other researchers to support VTE.

D: Effectiveness could refer to whether the team has accomplished its assigned tasks (Shea & Guzzo, 1987). Another approach embraces socioemotional consequences of group action, such as member satisfaction and attraction to the group as elements of effectiveness (Hackman, 1987).

Besides this model, some studies have focused on task dimensional factors (Bradley and White 2003, Kirkman & Rosen 2004) whilst other research has concentrated solely on social dimensional factors (Chin and Salisbury 1999, Matveev and Nelson 2004, Lin, et al 2008).

Researchers also have identified the importance of the role of communication (Gillam and Oppenheil 2006, Hollingshead 1998, Sarbaugh 1998, Anderson, et al., 2007, Jarvenpaa & Leidner, 1999) and relationships including the diversity of the team (Ancona & caldwell 1992), team cohesiveness, and team status (Driskell ,2003). Other factors that impact on team effectiveness include net-centricity (Anderson, 2002), team member expertise (Kanawattanachai & Yoo 2007), extraversion of team members and group interaction styles (Balthazard and Potter 2004).

Ale Ebrahim, Ahmed, Taha, in their 2009 study demonstrated that there are 4 keys to have a successful virtual team as below:

- **Team selection**: Team selection is a key factor which differentiates successful teams from unsuccessful ones. The selection of partners greatly affects mutual trust, knowledge sharing, and performance (WI et al., 2008). Virtual teams can be designed to include the people most suited for a particular project (Bell & Kozlowski, 2002). Virtual team leaders rather than need to make sure the project is clearly defined, outcome priorities are established, and that a supportive team climate, need to select members with necessary skills (Hunsaker & Hunsaker, 2008).

- **Reward structure:** The development of a fair and motivating reward system is another important issue at the beginning of virtual teamwork (Hertel, Geister & Konradt, 2005, BAL, & Teo, 2001). Virtual team performance must be recognized and rewarded (Bal & Gundry, 1999). Lurey and Raisinghani (Lurey & Raisinghani, 2001) in a survey in an effort to determine the factors that contribute to the success of a virtual team found that reward systems ranked strongly among the external support mechanisms for virtual teams.

- **Meeting training:** Comparing teams with little and extensive training, BAL and Gundry (BAL & Teo, 2001) observed a significant drop in performance as both teams went live using the system. However, the latter then improved its performance at a faster rate than the former. Training is a key aspect that cannot be neglected in team building. Virtual team members require some different types of training to ordinary teams. The training includes self managing skills, communication and meeting training, project management skills, technology training, etc. (BAL & Gundry, 1999).

- **Specify objective*:*** While direct leadership strategies are possible in conventional teams, members of virtual teams might be managed more effectively by empowerment and by delegating managerial functions to the members (Hertel, Geister, & Konradt, 2005). Such an approach changes the role of a team manager from traditional controlling into more coaching and moderating functions (Kayworth & Leidner, 2002).

BAL and Teo (BAL & Teo, 2001) similar to their study in (Bal & Gundry, 1999) identified 12 elements for effective virtual team's working by observation and interview. It is illustrated in below Figure below.

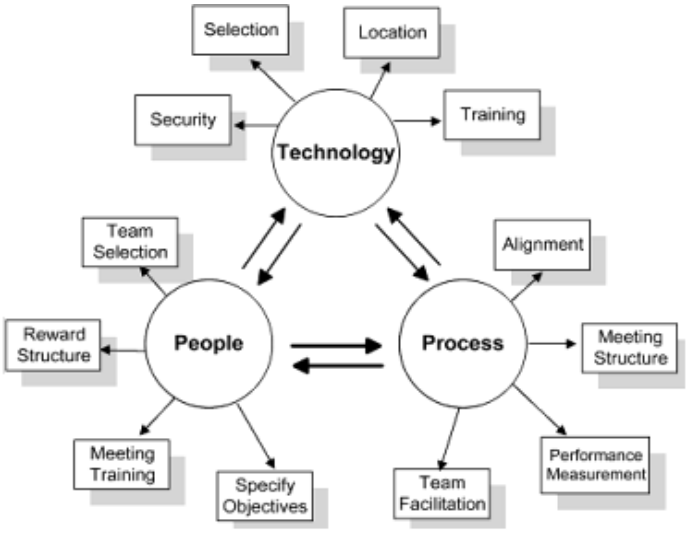


Figure 12 : Model for Effective virtual team working (J. Bal and J. Gundry, 1999)

Beside all said for teams moving from collocation to virtual environments, an ability to adapt and change can be a long process riddled with trial and error scenarios. This process is seen as necessary to encourage effective virtual teams (Kirkman, et al., 2002). Coordination can also play a positive moderation role in team performance (Massey, Montoya-Weiss & Song, 2001).

1.1.3.5. Life dynamics of Virtual teams

One of the most important concepts in Virtual teams' management is the four phases in a VT lifecycle (Griffith et al., 2003)

1. First, a company must create the right organizational environment (e.g., establishing supportive rewards).
2. Second, the work team should comprise suitably qualified team members who are assigned to appropriate tasks and goals.
3. Third, performance progress must be monitored and managed routinely.
4. Fourth, the team needs to execute assigned tasks efficiently and effectively.

Based on Hackman's (1987) categorization, we divide an SVT lifecycle into three main stages: team initiation and formation, task execution and monitoring, and task completion. This lifecycle is embedded within the facilitative organizational infrastructure controlled by management.

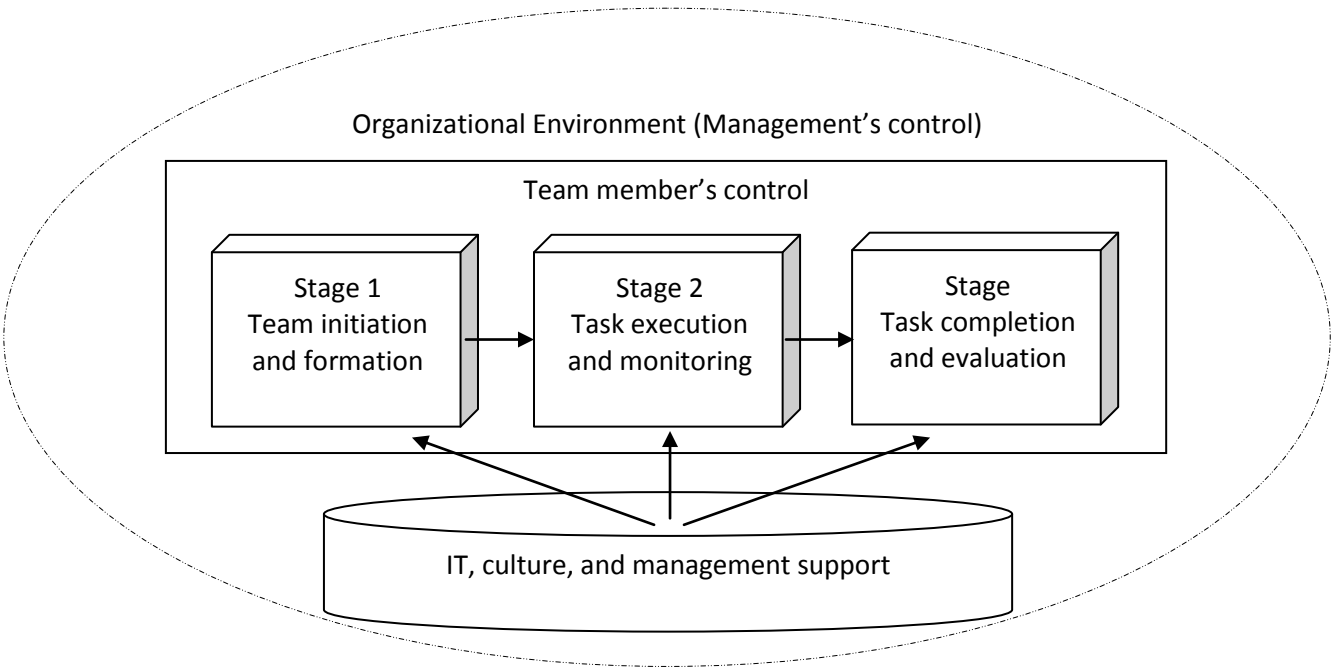


Figure 13 : A typical lifecycle of an SVT

Different lifecycle stages mentioned in the picture are so clear but the process of team formation has three key challenges (Tong & Yang, 2013)

1. Identifying members with the right skills
2. Forming a team with a strong team spirit
3. Coping with location and time zone barriers.

First of all, skills and expertise are critical dimensions of an optimal team structure (Bunderson & Boumgarden, 2010). Potential team members need to possess the right expertise and skill sets necessary for the task; previous experiences with similar tasks or projects are equally valued. If team is formed to resolve certain technical problems, members of the team should have faced similar technical problems before, and they should be experts in those relevant subjects. Moreover, skills complementarily among various members assist in ensuring the effectiveness of sub-task assignments (Humphrey, Hollenbeck, Meyer, & Ilgen, 2007). In line with these selection criteria, a professional expertise repository or expertise bank that explains individuals' prior experiences and detailed expertise would prove especially invaluable for providing reliable expert information.

Second, as a VO team has no hierarchically imposed regulations and participation is voluntary, forming a team with a strong team spirit represents a challenge. While team members endure minimal formal organizational penalties for breaking self-defined team rules, additional measures need to be established to deter irresponsible behavior or identify potential problematic members. Broadcasting a participant's performance online or providing search functions can be one way of delivering these messages. This strategy can help to highlight the importance of long-term reputation and professionalism in the context of teams.

Third, some potential members may be hesitant to participate in teams because they are geographically dispersed or in different time zones from other members, which could

complicate their future communication and coordination endeavors. There is some evidence that some VOs preferred potential members to be located within the same time zone.

To mitigate this concern, organizational management should provide support to internal and external team members for complementary use of various asynchronous communication technologies (e.g., emails, discussion boards, or knowledge sharing databases) as well as synchronous media (e.g., instant messaging, video conferencing, or telephone calls).

Overall, only by successfully addressing issues related to skills composition, team spirit, and location/time zone barriers can teams be established with an optimal team structure and commence functioning without undue delay. In VO team the responsibility of searching for team members lies primarily on the team initiator. Different from conventional work teams in which leaders often use their legitimacy to allocate team members, initiators of VO teams who lack formal authority may experience difficulty in finding suitable members.

Based on analysis of the VT lifecycle, Yu Tong et al. in their 2013 article compared VTs with conventional teams at different stages of a team's lifecycle. As shown in tables below, VTs exhibit more signs of innovativeness, flexibility, and democracy and tend to be more technologically savvy. However, the advantages of VTs can only be realized when organizations and team members appropriately manage the unique difficulties associated with this team structure.

As we saw in this section Virtual teams are one of the most important factors in VOs. It is clear that virtual teams need to communicate together to get the job done! This is important to analyze the identity of communication in teams and between staff in a VO. In the next section we will discuss more about a specific aspect of a VO as literature call it "Communication".

1.1.4. Communication

In recent years, there is considerable interest (both in research and practice) in virtual ways of organizing work within and across firm boundaries, for example Lipnack & Stamps and Maznevski & Chudoba did some researches on global virtual teams projects, (Lipnack & Stamps, 1997; Maznevski & Chudoba, 2000) and Markus et al. on geographically distributed communities and organizations (Markus, Manville & Agres, 2000). They all brought up this point which to manage the Virtual organization in any kind, one of the most important aspect is communication and the way VO members would exchange data and ideas .

Communication inside VOs happens in ICT platform and concentrates on different topics demonstrates as threads. Conversational threads have been defined in multiple ways, but a useful definition is provided by McDaniel et al. 1996 explaining a thread as a stream of conversation in which successive contributions continue a topic, following an initial contribution which introduces a new topic. (McDaniel, Olson & Magee, 1996; Grimes, 1975; Black et al., 1983; Rose et al, 1995)

The majority of studies that have examined computer-mediated communication found that Text-based communications is the main communication system (Baltes et al., 2002). Although the most common form of text-based communication is e-mail (Pulley, Sessa, & Malloy, 2002), most research has instead focused on synchronous communication technology, such as ‘‘chat’’ (Baltes et al., 2002). A suggested benefit of chat communication is that this type of text-based interaction may allow for more reflection and the ability to choose one's words more carefully than in FTF or telephone communication (Wolfe, 2002). Chat can also allow team members to more efficiently share ideas in brainstorming tasks because everyone can ‘‘speak’’ at once, thereby minimizing process losses (Griffith & Neale, 2001). Additionally, chat may neutralize the tendency for increased relational conflict often observed in demographically dissimilar groups, because these differences are less salient (Mannix, Griffith, & Neale, 2002).

Conversation in this medium, however, has also been criticized for lacking focus because multiple group members may be speaking at the same time (Wakertin, Sayeed, & Hightower, 1997). Also, different rates of typing and reading can lead to more or less delayed responses by individuals within the group discussion, and could result in low contributions by some members who could otherwise improve the team's performance.

While most virtual team members had a positive communication experience overall, the biggest area of challenge in a VO is in the same area. These challenges fell into several categories. The first was lack of enough communication to create a project visibility. Team members know what they are doing on an individual basis but the biggest challenge is to give them enough information to get the image of the way their pieces fit into the whole puzzle.

Second, sometimes challenges are in actually getting a hold of people. It will be absolutely frustrating not being able to get communication response from colleague in a VT soon as somebody like. After sending a question if they never get back any answers so they don't know how to interpret it.

Despite of these 2 set of challenges there are other factors that need to be mentioned. In comparing the threading activity of face-to-face and computer-mediated communications, Yats et al in their 2003 research find more threading by those participants engaged in computer mediated interactions. They engaged in a range of threading activity to establish and maintain continuity, coherence, and coordination in their collaborative work over time. In particular, organizational members relied on simple threads to focus their attention and action on a particular topic over a short period of time, concurrent threads to enable their participation in multiple topics at the same time, and compound threads to allow provisional settlement of key issues that were subsequently revisited over extended periods of time. (Yates, Orlikowski, Woerner, 2003; McDaniel, Olson & Magee, 1996)

Also it has been argued that efficiency in computer-mediated communications (CMC) is lower than Face to face communication due to the lack of speech acknowledgements and the fact that CMC consumes more time in explaining the conversation context (Borges,

Brezillon, Pino, & Pomerol, 2007; Ahn, Lee, Cho & Park, 2005; Sarbaugh-Thompson & Feldman, 1998).

As noted by McDaniel, Olson and Magee (1996), increased concurrency is particularly pronounced when members interact via asynchronous electronic tools, as the delay between contributions provides time for additional conversations. But on the other hand increased concurrency may decrease the amount of elapsed time required to complete a set of tasks, and it may allow members to make connections across different conversations. (McDaniel, Olson & Magee, 1996)

According to the points in previous paragraphs, communication issues are not necessarily technical in nature, but rather depend and related to human factors. For example members in a virtual team may find it frustrating that messages are misunderstood or not received by other members thereby resulting in inefficiencies. Areas causing these difficulties include e-mail slang and informalities, technical jargon, confusion over teleconferencing protocols and outdated distribution lists. There is also the problem regarding ambiguity about whom to include in the communications.

To be conservative, a virtual team member may send messages to everyone on the team, which contributes to mailbox overload. On the other end of the spectrum, team members may inadvertently leave out important constituents in the communication loop, thereby leading to situations where critical information was not received in a timely manner. Also there is a problem with store-and-forward asynchronous communication systems in that it often takes time to communicate. There is the delay in waiting for a response after a message is delivered. This may be an issue when critical information must be passed on in a timely manner. (Pang, 2001) and this may seems like a disadvantage.

As this may seem a disadvantage to asynchronous (not in the same time) communication in virtual teams, but it may be more effective in some aspects since communication can take place over an extended period of time. The delay between response and feedback can provide members with the opportunity to think about the problems and reflect more efficiently before responding (Dufner, Kwon, Park, & Peng, 2002). Likewise one of the most important aspects of CMC is being mostly based on text! Straus et al. (2001) discuses that significant information is often not communicated within a message. It is because text messages may take more time to comprehend for the recipient because of the absence of visual cues and linguistic expression.(Straus, Miles & Levesque, 2001) but giving a particular time and effort to write down messages would add more structure to the communication.

In order to face these challenges Gould in his research (1997) suggested some tips on alleviating communication problems:

- ✓ **Include face-to-face time if at all possible**. Meet face-to-face periodically throughout the life of the project. These meetings will help to establish ties and relationships among team members.

- ✓ **Give team members a sense of how the overall project is going**. Sending team members copies of the updated project schedule or provide an electronic view of the project schedule on line using the Internet using the team's Web site. The primary idea here is to improve the quality and type of communications with all team members. They need to know where they fit in the big picture.
- ✓ **Establish a code of conduct to avoid delays**. The code could include a principle of acknowledging a request for information within 24 or 48 hours. A complete response to a request might require more time, but at least the person requesting the information would know that the request will be addressed.
- ✓ **Don't let team members vanish**. Use the Internet or workgroup calendaring software to store team members' calendars. While this could be difficult to maintain on a daily basis, it should not be difficult to keep up with scheduled out-of-town absences such as vacations or business travel.
- ✓ **Augment text-only communication**. The Internet is a good place to store charts, pictures, or diagrams so everyone can have a look. The fax machine, once a modern marvel but now surprisingly old-fashioned, can help here too.
- ✓ **Develop trust.** Charles Handy, an author and management consultant, addresses this issue quite clearly. "If we are to enjoy the efficiencies and other benefits of the virtual organization, we will have to rediscover how to run organizations based more on trust than on control. Virtuality requires trust to make it work: Technology on its own is not enough (Gould, 1997).

Oertig and Buergi in a research in 2006 indicated that in VOs, team communication can be classified into two categories:

- ✓ Task-related , including those that helps ensure each member is contributing fully
- ✓ Socio-emotional, including those that increase the cohesion of the group

Those communications that are directly task-related are the most critical for the performance of dispersed teams. Also, virtual teams have communications that increased the levels of mutual support, member effort, work coordination, balance of member contributions. Moreover, dispersed teams that had high levels of task-related communications were notably able to outperform collocated teams with similar levels of those same processes and communication despite the physical separation of their members. In other words, the overall effect of dispersion is not necessarily detrimental but rather depends on the quality of a team's task-related communication and processes.

Also Erickson in 2000 categorized the communicative ecology (use of different, concurrent threads of communication) of a particular virtual team, organization, or community and that might be identified by the types and frequencies of its communicative practices, such as threading activities. Such ecology would reflect the influence of factors such as:

- ✓ whether members are engaged in a common task
- ✓ the components of which need to be coordinated (a group with minimal coordination demands would be less likely to have a use for concurrent threads);

- ✓ whether the group or community is interacting over an extended period of time (compounding of threads is less likely in discrete interactions such as those through instant messaging than in ongoing interaction via email);
- ✓ whether the media in use support synchronous or asynchronous communication (asynchronous media such as email are currently more capable of supporting multiple concurrent conversations than such synchronous media as telephone conferencing);
- ✓ Whether members share linguistic and cultural backgrounds (groups that must contend with multiple languages and/or cultures may find it more difficult to carry on concurrent threads without confusion). (Erickson, 2000)

Beside these roadmaps there are many researches that recognized the effect of cultural and social factors on the performance and satisfaction of virtual teams. Social factors such as relationship building, cohesion, and trust are crucial for the effectiveness of virtual teams (Chang & Bordia, 2001; Gillam & Oppenheim, 2006). Computer-mediated communication has been found to promote the exchange of social cues to build interpersonal relationships between team members in the early development of virtual teams (Chen, Lieu, Wang, Fan & Chi, 2007; Arbaugh & Benbunan-Fich ,2007; Maznevski & Chudoba ,2000; Robey, Khoo & Powers, 2000) as well as to foster cohesion among team members (Carron, Brawley & Widmeyer, 2002). Relationship building and cohesion have been associated with better performance and satisfaction in virtual teams (Lurey & Raisinghani 2001; Maznevski & Chudoba 2000; Powell, Piccoli & Ives, 2004).

Relationship building can strengthen feelings of inclusiveness or a sense of belonging to teams and further foster cohesion (Powell, Piccoli & Ives, 2004). The Time-Interaction-Performance theory developed by McGrath, he proposed that a supportive group ethos and group well-being is directly related to developing relationships in virtual teams. Communication in a team can be task or interpersonally oriented, because team members satisfy social and goal accomplishment needs through membership. Both of these needs are critical for the continued maintenance of the team (McGrath, 1991).

Studies on values and culture in traditional organization have focused on dimensions, like individualism– collectivism, power distance, uncertainty avoidance, femininity–masculinity, long-term orientation, conservatism, autonomy, egalitarianism, hierarchy, mastery, harmony, loyal- involvement, utilitarian-involvement (Chinese Culture Connection, 1987; Hall, 1981/1976; Hofstede, 1980; Kluckhohn and Strodtbeck, 1961; Schwartz, 1994; Triandis, 1995; Trompenaars and Hampden-Turner, 1998).

These aspects cannot be treated separately from the established organizational norms and processes, which make up the culture of an organization. Ruch (1984) argues that information technologies and their use in the context of communication are bounded by cultures. The culture of an organization represents a complex set of behaviors, practices, and expectations shared by its members. More specifically, organizational culture can be analyzed in terms of behaviors, values, and beliefs, as well as more subtle assumptions (Schein, 1985).

The cultural orientations of organizations have a significant impact on organizational communications (Ronen, 1986). Among the cultural dimensions proposed in the literature, Hall's conceptualization of high vs. low-context cultures that has been under- researched needs to be studied as an organizational culture dimension due to its direct relevance to communications. The fact that e-commerce contains communications, connections and collaborations as its components (Zwass, 2003) help us understand why the type of cultural context prevailing in the organization may explain a firm's treatment of e-commerce issues.

Hofstede et al. (1990) have proposed that organizational cultures can be differentiated more in terms of 'practices' rather than 'values'. Recent research has used similar dimensions for national and organizational cultures, where organizational cultures are measured via practices (House et al., 1999). In organizations where high-context practices prevail, the context and nonverbal behaviors are important for understanding and transmitting messages. On the other hand, in organizations where low-context cultures are dominant, a large portion of the meaning is explicitly transferred in the words. (Kabasakal H, Asugman G, Develioğlu K, 2006)

Culture has been defined by Hofstede (1980) as 'the collective programming of the mind which distinguishes the members of one group from another.' Thus, culture is learned and may be manifested in different ways according to nationality, ethnicity, or even organizational settings. In virtual team settings, culture may have a profound impact on how individuals perceive information, act upon it, and relate to other individuals.

As team members communicate, they will tend to filter information through their cultural 'lenses', thereby giving rise to a potentially broad range of misinterpretations or distortions (Solomon, 1995). Thus, a Mexican team member may view the same issue in a totally different way than a member from a European project manager does. Although cultural differences may bring a greater variety of perspectives to bear on a problem domain, they may also create additional communication challenges for team members.

Kayworth T, Leidner believed that over half of the virtual teams observe cultural differences significantly affected their ability to communicate ideas and to coordinate the project. The most common cultural issue was the language barrier which accounted for a great deal of information loss and distortion as individual members attempted to decipher communication through their own cultural perspective. (Kayworth T, Leidner D,2000)

In the context of differences that culture can create, Sawyer and Guinan (Sawyer & Guinan, 1998) studied 40 software development teams and found that social process skills (such as the ability to resolve conflict) is more important than task skills in project quality and team performance. Social process skills account for more than 25 percent of variation in software product quality. Janz, Wetherbe, Davis & Noe in 1997 surveyed 231 IS professionals from 27 systems development teams across 13 organizations and found that mission clarity, team collaboration and team unity is predictive of improved work outcomes, increased job satisfaction, satisfaction with personal growth and worker motivation (Janz, Wetherbe, Davis & Noe, 1997).

As mentioned above language and cultural issues were closely connected to how a virtual organization performs. Language difference is a major concern, for example Oertig and Buergi (2006), mentioned that use of English was an issue in particular when dealing with sub-teams used to working in German, as well as Japanese colleagues on all levels and paying attention to the pace of speech, slang, and different accents are important. Also differences in cultural attitudes between Europe and the USA were reported in connection with trust. Another key issue was the recognition and interpretation of different communication patterns, e.g. learning to read between the lines in meetings. This involved getting their trust and achieving good communication as well.

So far based on literature we found out that within organizations, the role of workplace culture in affecting productivity and work relations has long been recognized (Hofstede, 1991) and culture change has generally been advocated as an avenue to increase work effectiveness (Argyris, 1999; Senge, 1992). A positive corporate culture is also seen as a critical component in the effective transition to virtual working (Suomi and Pekkola, 1999). Ogbor (2000) and others however adopt a critical stance and describe corporate culture as a hegemony which dominates and excludes alternative views and practices. Ogbor (2000) explains how the legitimated norms and values of an organization generally reflect those of the wider society and that identity is reshaped through socialization according to the values and institutions which are prescribed by the organization.

Besides scholars stress that effective VTs fit their communication patterns to the task and keep a strict pace of face-to-face meetings (Pawar & Sharifi, 1997; Maznevski & Choduba, 2000). In addition, they suggest that temporal collocation and face-to face meetings among virtual team members increase communication effectiveness and information sharing (Sole & Edmondson, 2002). Pauleen and Yoong (2001) found that some electronic communication channels are more effective than others in building online relationships. In their study, email was the basic channel for communication but was used primarily for information sharing and not for relationship building, which was primarily supported by telephone exchange.

Categorization of communication incidents are performed in several studies, using various categorization schemas. Maznevski and Choduba (2000) distinguish among communication incidents based on objectives: information gathering, problem solving, idea generating, and comprehensive decision-making. Categories of communication behavior of virtual teams using a synchronous virtual room (Qureshi, 2000) include providing information, seeking information, requesting action, confirming action, seeking consensus, stating a problem, stating a solution, notifying of the occurrence of an event, making a decision, volunteering assistance, raising funds, seeking funds, providing funds, and providing humor. The first two, providing information and seeking information, were the most frequently observed behaviors in this case study. Besides robey et al. (2000) categorized communication differently, sorting it into three types: communication for cultural understanding, task-related communication, and socio-emotional communication.

Although there are very few studies on virtual team interaction styles, but results from these studies are interesting. Research has shown that communicating virtually does not

substantially affect how interaction styles impact team outcomes. Specifically, the effects of FTF and virtual interaction on decision performance and processes have been found to be directionally consistent (Potter & Balthazard, 2002). Also, the effects of virtual team interaction styles on solution quality and acceptance are similar in magnitude to FTF teams (Potter, Balthazard, & Cooke, 2000).

The strengths of relationships between certain interaction styles and team performance, however, have been found to differ between FTF and virtual teams. For example, a constructive interaction style is the most conducive to high team performance in either FTF or virtual teams. A passive interaction style, however, tends to result in lower performance for virtual than FTF teams, likely because it is easier to ignore other team members in a virtual setting, and more difficult to reverse or moderate passivity (Potter et al., 2000). Another interesting difference is that aggressive interaction styles have been found to do less damage (e.g., limiting team member input) in a virtual team, possibly because technology-mediated communication makes it easier for all members to contribute rather than being significantly hampered by a dominating team member (Potter et al., 2000).

To summarize this section we will discuss about advantages and disadvantages of Computer-Mediated Communication. CMC has many advantages for organizations given increased globalization and the need for rapid knowledge transfer across borders and time zones. Additionally, CMC addresses many of the disadvantages of face-to-face communication, such as cost and minority expression. In addition to cost savings, CMC eliminates the non-verbal cues and power differences (Bower et al., 2001) that inhibit equal participation, resulting in more equal levels of participation within heterogeneous groups (Dietz-Uhler & Clark, 2001; Hertel et al., 2005; Lind, 1999).

Also, CMC can create equal opportunities in the workplace. Physically disadvantaged employees have greater access to the virtual environment than the physical workspace, creating teams that are more diverse in makeup and fostering greater creativity and innovation. Moreover, as performance in a virtual team is evaluated solely on productivity (given that physical appearance remains anonymous), age and race discrimination are greatly reduced in a virtual setting (Bergiel et al., 2008). However, as technologies offer greater information richness, these differences may begin to reappear.

In addition to cost and minority expression, CMC has a number of other advantages. CMC addresses time constraints (Cascio, 2000), as asynchronous technologies (with a delay between sender and recipient, such as email) allow users to communicate at any time and location with access to the technology (Dietz-Uhler & Clark, 2001; Rosen et al., 2007). Additionally, CMC provides organizations with access to experts that would otherwise only be accessible at very high travel costs (Cascio, 2000; Rosen et al., 2007). Moreover, CMC holds promising implications for recruitment. With CMC, organizations can recruit talented individuals who may not be willing to relocate for a job but are willing to work virtually (Bergiel et al., 2008; Cascio, 2000). Generally speaking, Dietz-Uhler and Clark (2001) argue that CMC is a practical alternative to face-to-face communication, as participants report it to be enjoyable, effortful and valuable

Among from disadvantages of Computer-Mediated Communication we could mention logistical and deep-rooted ones. CMC poses countless technical and logistical problems, which often are very time-consuming, such as scheduling, coping with time delays and encountering software problems (Bergiel et al., 2008; Bower et al., 2001). Specifically, synchronous CMC (modes of technology that occur in real-time, such as video-conferencing or instant messaging) can be difficult to schedule due to time zone barriers (Bergiel et al., 2008). Training and technological expertise issues also arise in a virtual environment, (Bergiel et al., 2008; Powell et al., 2004) as team members frequently lack the training necessary to function effectively and navigate the technology in a virtual environment (Bergiel et al., 2008).

CMC also generates many interpersonal challenges. The absence of non-verbal cues and tacit knowledge transfer makes communication difficult (Bower et al., 2001; Lantz, 2001; Hill, 2000; Powell et al., 2004). These deficiencies eliminate social presence and hinder relationship formation, cohesion and trust, all of which are imperative to a virtual team's success (Cascio, 2000; Powell et al., 2004). Specifically, Stark and Bierly (2009) found a positive correlation between highly virtual groups and interpersonal conflict, such that groups with high levels of virtuality also exhibited higher levels of interpersonal conflict (figure below). (Heller R, 2005)

Additionally, CMC poses coordination challenges. It can be difficult to establish a vision and mission in a virtual team due to the flexibility of time, space and the lack of visual cues (Dewar, 2006). Due to cultural and language differences, knowledge sharing can also be difficult in a virtual team (Bergiel et al., 2008; Powell et al., 2004). Powell et al. (2004) found that culturally diverse virtual teams experienced coordination and communication issues. Moreover, a lack of proper databases and people trained to maneuver knowledge can result in "information overload" (Rosen et al., 2007). When coordinating with external or intra-organizational constituencies, the speed and ease of virtual communication can send a message of unimportance to the recipient (Storper & Venables, 2004).

Advantages	1. Creates grater equality 2. More opportunity for physically disadvantages 3. Reduces costs 4. Allows communication across time zones and locations 5. Enables access to experts 6. Has positive impact on recruitment
Disadvantages	1. Technical problems common 2. Difficult to schedule synchronous meeting across time zones 3. Has negative cultural issues 4. Requires relevant training and comfort with technology 5. Can create Information overload 6. Lack of social presence 7. Higher levels of interpersonal conflict 8. Difficult to coordinate with rest of organization 9. Can send message of unimportance to recipients

Table9 : Advantages and Disadvantages of Virtual Communication (Heller R, 2005)

After discussing about communication as one of the most important bottlenecks in a VO we must analyze the virtual leader role and challenges to manage this kind of organizations in the next section.

1.1.5. Virtual Leadership

A virtual organization consists of especially skilled members who are often organizationally or geographically separated. These organization or their teams are heavily dependent upon computer-mediated communication to complete their tasks. Current scholarship of Virtual leadership says the goals of leadership have not changed, but the new V-leader needs to implement those goals electronically on computer mediated virtual organizations that are dispersed over space and time. What is very different is that the V-leader may never physically meet one or more of the followers, and that the main communication medium is the computer.

Zaccaro and Bader (2003) noted that today‘s organizational leader grapples with two interrelated forces: the increasingly global dispersion of divisions and subunits, customers, stakeholders, and suppliers of the organization; and the exponential explosion in communication technology that has led to greater frequency of daily interactions with colleagues, coworkers, subordinates and bosses dispersed geographically. As a reaction to these changes, organizational scientists have begun to talk about V-leadership to refer to leaders who conduct many of the processes of leadership largely though electronic channels. The authors postulated that in view of the rapid technology growth in organizations and their increasingly global reach, in the near future V-leadership will be the routine rather than the exception in our thinking about what constitutes organizational leadership.

This new paradigm provides a range of new opportunities like the ability to instantly communicate one-on-one with employees, customers, and suppliers; the capability to use talent wherever it exists; the opportunity to enhance organizational performance by assembling better multi-functional teams, and to improve better customer satisfaction by using the follow the sun methodology; the ability to cut costs; and, scope for better knowledge management. These can positively impact an organization‘s competitive advantage. However, V-leaders also have new challenges like how to bridge the physical distance from the followers; how to communicate effectively with far-flung team members; how to convey enthusiasm and inspire followers electronically; how to build trust with someone who may never see the leader; and so on. They need new skills for success. (Das gupta, 2011)

In virtual organization, leaders are often the nexus of the team, facilitating communications, establishing processes, and taking responsibility for task completion (Duarte, Tennant-Snyder, 1999). The importance of leadership in VOs is noted in the practitioner literature (Lipnack & Stamps, 1997; O'Hara-Devereaux & Johanson, 1994), and recent research (kayworth and leidner, 2001) has begun to look at leadership issues in virtual teams (Pauleen, 2003).

Avolio, Kahai, and Dodge (2000) reviewed existing literature to reach a broad understanding of what constitutes v-leadership in organizations. We chose the term V-leadership to incorporate the new emerging context for examining leadership. The authors defined v-leadership as a social influence process mediated by AIT (advanced information technology) to produce a change in attitudes, feelings, thinking, behavior, and/or performance with individuals, groups, and/or organizations. They also asserted that v-leadership can occur at any hierarchical level in an organization, involving both one-to-one as well as one-to-many interactions over electronic media. (DasGupta, 2011) Now in the next section we will discuss about the roles of V-Leader and what are the skills that they need to have in order to do their job perfectly.

1.1.5.1. Virtual leaders and conventional work team's leaders: different roles?

Leaders in the virtual environments must learn to deal with greater logistical complexities, inter-company coordination, and must also account for significant country and cultural differences (Kramer, 2005). Although in traditional organization the project leader and manager have complementary roles, at least in theory, in VOs leader is responsible for the overall strategy, while the project manager in teams are responsible for operational management of the project. All these differences create new set of roles for them. These may even arise in non-global roles where significant levels of diversity are present.

Kramer published seven key competencies aimed at global leadership in his 2005 research. As a Virtual organization leader, must be a good global leader these competencies seems to be valuable for them. These competencies appear to be consistent across much of the research on global leadership, which arguably always consists of virtual components:

- ✓ They must be open minded and flexible in thought.
- ✓ They should have an interest and sensitivity in new cultures.
- ✓ They must be able to deal with complexity and be prepared to make decisions that encompass multiple variables, considerable ambiguity, and evolving environments.
- ✓ They must be creative, positive, resilient, resourceful, optimistic, and energetic.
- ✓ They must maintain honesty and integrity.
- ✓ They must have a stable personal life and, when applicable, a family that supports a global commitment to work.
- ✓ They must bring value added technical or business skills that lend credibility to their role (Kramer, 2005)

Shachaf and Hara (Shachaf, 2005) suggest four dimensions of effective VO leadership:

- ✓ **Communication**: the leader provides continuous feedback, engages in regular and prompt communication, and clarifies tasks.
- ✓ **Understanding**: the leader is sensitive to schedules of members, appreciates their opinions and suggestions, cares about member's problems, gets to know them, and expresses a personal interest in them.

- ✓ **Role clarity: the** leader clearly defines responsibilities of all members, exercises authority, and mentors virtual team members.
- ✓ **Leadership attitude**: the leader is assertive yet not too bossy, caring, relates to members at their own levels, and maintains a consistent attitude over the life of the project.

It is interesting to see that both Kramer and shachaf insisted on communication as one of the most important factors. As we also saw in previous section the context and material in communication conveyed a greater awareness and usage of interpersonal processes; it is the use of communicative skill that differentiates V-leaders in a virtual organization. Due to the increasing popularity of VOs, researchers have focused on the real interest of leader emergence and team development in virtual environments. However, there is little concern from a methodological point of view, which is the implication of these that varies from virtual to face-to-face environments. (Kelly, Davis, Nelson, Mendoza, 2008)

Research on these dynamics and the person who is the official leader found that it is the amount and quality of communication that predicts the emergence of an individual as a leader. Emergent leaders communicate more with other members (Misiolek & Heckman, 2005). However, it is not merely the sheer amount of communication that predicts leader emergence but rather the content and quality of the communications (Cassell, Huffaker, Tversky & Ferriman, 2006; Sarker, Grewel & Sarker, 2002).

Also, having a certain Leadership skill have been emphasized by both Kramer and shachaf. In the other hand only Shachaf mentioned about the importance of role clarity for the staff. Clearly task assignment is one of the other major roles of a V-leader. This task must be clearly described and assigned to prevent any conflict. Whenever a VO member log in, they get access to a restricted set of functionalities based on the role assigned to them by the VO leader. VO leader must predict and approve member's access level to the resources based in the process that assigned for the projects and tasks. A VO leader is responsible for enrolling staff and resources into the VO. She/he also allocates members to the resources and views the overall resource usage of the VO. (Saleem, Krznari, Newhouse & Darlington, 2003)

Keeping a close relation with staff has been emphasized by both Kramer and shachaf. The VO leader must have one-to-one contact with key members of VO. This is necessary for relationship building and maintenance and "bringing in" people over whom the leader had no authority, and then "making them stay". Leaders could not try to impose things on people. They had to adopt different leadership styles and apply them as needed. Creating pleasant environment with a positive atmosphere, and talking about good results to make people feel appreciated is also so important. Accepting people's weaknesses is empathy, showing understanding of the other pressures and influences affecting them.

As the other role of a V-leader we can consider task management. Oertig and Buergi in their 2006 research discussed that there are few steps that a VO leader on the team level must take to manage the task effectively.

1. Defining Team operating guidelines
2. Setting up a process that is simple and workable

3. Communicate that within the line.
4. Being transparent about the invisible timetable and giving a bit of detail behind the scenes.
5. Checking people's written communication sent out, by doing follow-up, making phone calls or personal contact, as the geographical setting allowed.
6. Keeping everyone on the same level of information is something that had to be worked at, in particular if things are moving fast in one particular corner. (Oertig, Buergi, 2006)

Here we want to differentiate V-leadership competencies depending on the type of teams and organization they will lead. We already mentioned these different kinds of V-teams in previous sections. Duarte and Snyder listed the seven different types of virtual teams and then rates seven leadership competencies required for that type of team as Low (L), Medium (M), or High (H). This tool will assist leaders in their personal development plans (Duarte & Snyder, 1995). To create a better understanding of the results of Duarte and Snyder research we considered L as 1, M as 2 and H as 3, and calculated average of each column to come up with the following Table.

Type of team / **Leadership competencies**	**Networked**	**parallel**	**Project or product**	**Work or product**	**Action**	**Service**	**Management**	**VO**
Performance management and coaching	2	2	3	3	2.5	3	2	2.5
Appropriate use of technology	3	3	3	2.5	2.5	2.5	2	2.64
Cross cultural management	3	3	3	3	3	3	3	3
Career development and transition of team members	1	2	2.5	2.5	1.5	2.5	2	2
Building trust	3	3	3	3	3	3	3	3
Networking	3	2	2	2.5	2.5	1.5	3	2.35
Developing and adapting team process	3	3	3	2.5	2.5	2.5	2	2.64

Table10 : V-leadership competencies depending on the type of teams and organization

As the comparison of these mean seems to be difficult here we show them as a graph for altogether leadership rating in each kind of VT.

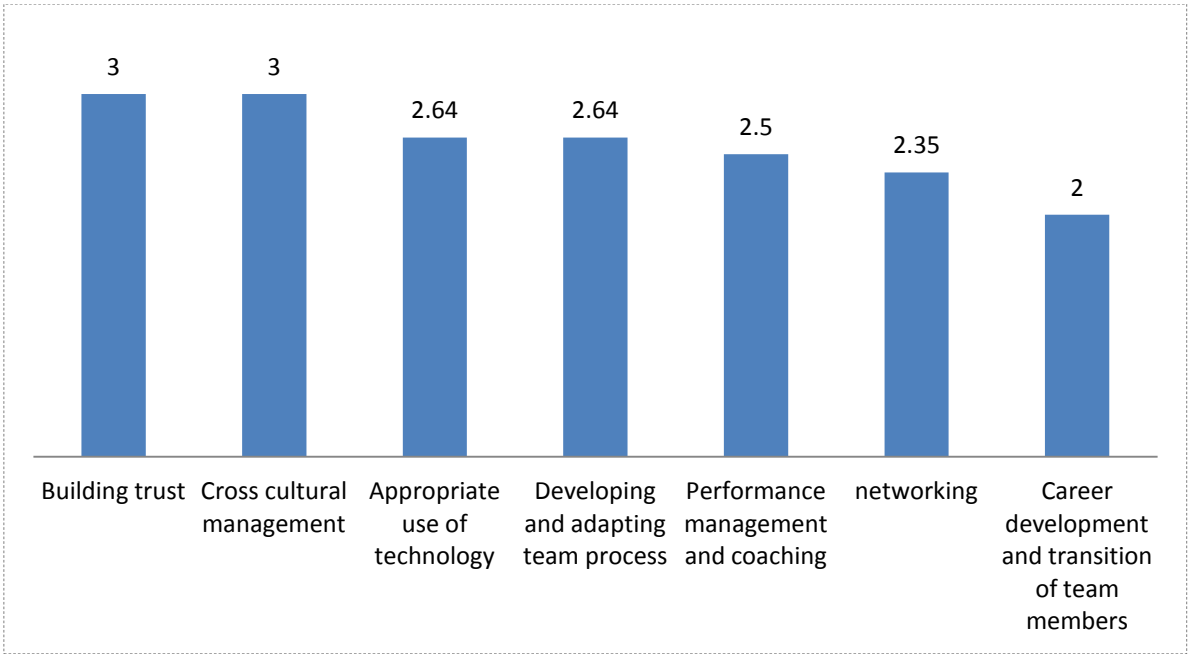


Figure 14 : Leadership competencies ranking in VOs

This Diagram shows that, building trust and cross cultural management are the most rated leadership competencies in VOs.

These concoctions raise the question that what are potential forms that leadership may take in these changing work environments? If organizations are indeed becoming increasingly flexible and virtual, will a single person taking on the 'leadership role' in teams or even larger units become obsolete? Several scenarios imply a reduced importance of the role of leadership. One such scenario is 'disposable leadership'.

As organizations increasingly rely on temporary arrangements, such as virtual project teams set up for a limited duration for a specific task, leadership itself may become such a temporary arrangement. Leadership is then limited in scope and duration. Any member with relevant knowledge and experience can lead a specific project and people may work in multiple teams simultaneously, as leader in one and as member on another (Shamir, 1999; Den Hartog, 2004).

A similar scenario that reduces the importance of single person leadership in the virtual arena would be emphasizing shared, distributed, or collective leadership. The common element in these ideas about leadership is that it will not be concentrated in the hands of one single person or even a limited group. Instead, the leadership role may be divided and performed by many or all team members simultaneously or sequentially (Shamir, 1999). The idea behind 'self-managed teams' also implies such a transfer of the leadership responsibility from an individual to the team as a whole (Barker, 1993).

Another scenario of where leadership in virtual contexts might be headed that implies a reduction of the importance of leadership is 'teleleadership' (Shamir, 1999). The increasing use of computer mediated technologies and group decision support systems may enhance the

importance of leadership functions that relate to the transmission of information between leader and group members. It may also reduce the distance between top- and lower hierarchical levels in the organization through enabling more effective communication between these layers. The role of leaders may then be reduced to more cognitive elements (managing information flow) rather than the more social, human and emotional elements of leadership.

Now let's see if there is any similarity and distinction between VOs and Traditional Organizations from the perspective of leadership and followership.

Shachaf and Hara (Shachaf, Hara, 2005) believed Leaders in VTs face challenges that are different from the traditional face to face environment (Oakley, 1998; Switzer, 2000). Leaders' aggressiveness and assertiveness, for example, are directed by cultural norms (O'Hara-Davereaux & Johnsen, 1994). As a result, the VT leader must develop a style that will fit the cultural composition of its team members and optimize the cultural differences (Oakley, 1998; O'Hara-Davereaux & Johnsen, 1994) Lurey and Raisinghani (2001) suggest that leadership style is related to virtual team effectiveness only moderately. Switzer (2000) found no differences in leadership profiles between the virtual and FTF group leaders. Hara, Bonk, & Angeli (2000) found that discussion leaders influence cognitive and metacognitive depth of students' online discussions.

Leadership is the main focus of Kayworth and Leidner's study (2001) of thirteen VTs comprised of students from the USA, Mexico, and France. The goal of their study was to identify the factors that contribute to effective leadership in a virtual team environment. Their quantitative analysis reflects that a significant predictor of leadership effectiveness in the virtual environment is the mentoring capability of the leader. How this leader can help other members to grow and take more responsibility. Furthermore, effective leadership is associated with team members' perceptions of communication effectiveness, communication satisfaction, and the ability of the leader to establish role clarity among team members (Kayworth & Leidner, 2001).

In some circumstances, similar to the leader in conventional work teams, the initiator of a VO takes the leadership role and management with other members following him/her throughout the entire lifecycle. However, such leadership is primarily based on the initiator's familiarity and expertise with the task rather than organizational authority. Hence, other members of VO could have many more opportunities to participate in team's management and coordination compared to conventional teams.

In other words, leadership and followership in VOs may engender more flexible changes. A member can either be just a follower throughout the entire lifecycle or play a management role over time. This type of behavior is less likely to happen in a conventional work team under tight hierarchical management control and with a relatively stable team structure. In addition, during project execution, the demand for rapid task outcomes and the lack of prior familiarity among team members can possibly result in low levels of trust, stickiness, and

sense of belonging. Subsequently, these challenges are likely to cause newly formed VOs to fail in the midst of a project. (Tong, Yang ,Teo, 2013)

Etcher in 1997 named the traditional management role as "heroic" and the virtual role as "post-heroic". The Heroic Leader (Bradford & Cohen, 1987; Huey, 1994; Ghiselin, 1994) operates in a traditional hierarchy with traditional command, control, and reporting structure. The Post-Heroic leader operates in a role set, that is, an influencing relationship where there is little direct control. Effectiveness may be more a result of persuasion and communication than authority. In this case, the Post-Heroic Leader interacts with many individuals, suppliers, customers, employees, other managers, community not simply direct report employees. Visually, the Heroic Leader operates in a traditional organizational pyramid, and the Post-Heroic Leader acts as a hub to various organizational spokes in a wheel. (Etcher, 1997)

1.1.5.2. Control employees in VO

Based on Davidow & Malone (1992) it can be argued that to perform active and effective in a Virtual Organization actors need to realize that wealth and success will no longer be measured in terms of direct control, ownership or physical assets but more in terms of ownership and access to knowledge intensive, value adding and technology driven types of communication. Also one of the main duties of a VO leader is to control staff and employees in the virtual space. Control is the ability to manage a resource towards achieving a goal, in particular through maximizing the motivation and capability of staff to act towards commercial ends (Thompson, 1989).

Direct control over work can be divided into three forms: input, process and output controls (Adami, 1999). In distributed organizations, input controls involve selecting and shaping all materials that are inputs to the work process, such that desired outcomes are more likely. Process controls are external controls which monitor or shape staff behaviors during their outside assignments. Output controls are external controls of the outcomes of remote projects.

The VO literature suggests that knowledge workers are difficult to regulate and monitor using direct controls: "In the world of knowledge work, evaluating performance is difficult. How can a manager determine whether enough of a knowledge worker's brain cells are being devoted to a task?" (Davenport, 2005). And this is even more challenging when a manager wants to evaluate performance of a VO. Drucker (1999) stated that knowledge work is a "volunteer" activity, not to be managed through command and control techniques: he is not the only author to note the importance of internal control of knowledge work.

McKinlay (2005) states "The primary means of managerial control of knowledge work is the regulation of the employees' self rather than work flows or tasks." This would seem to be even truer of virtual knowledge workers, who are in remote contexts and removed from the interaction with colleagues and the watchful eye of management. External controls are superficial and often impractical, and there is insufficient routine to provide the foundations for a regulatory framework.

Internalized control becomes a far more effective means of ensuring the optimum application of effort in the service of the firm. These forms of conformance are induced by the sedimentation of values acquired in primary and secondary socialization (Berger and Luckmann, 1967). The discernible forms of internalized institution which control the actions of virtual knowledge workers in the division appear to be professional pride, individual self-interest, management logic, creativity or self-expression in work, and a sense of belonging to the larger organization.

In virtual work relationships, employees can be non-permanent and physically remote. Examples are telework, customer-site frontline work and remote project work (Crandall and Wallace, 1998; Jackson, 1999). In these configurations, new systems for the regulation and monitoring of employee performance are needed (Adami, 1999; Depickere, 1999). Such control systems need to align the interests of employees with the interests of the organization if the organization is to retain the commitment of its employees.

Control systems monitor conformance to a set of rules and the production of desired outputs. Procedures, quality management, hierarchy, rules, budget, task allocation and discipline are direct forms of behavior control, but indirect forms include job descriptions, culture, performance appraisal, career development, compensation, training and flexible work arrangements. Traditional forms of management have emphasized command and control using procedures, measurement and standardization. Whilst able to harness and direct work, these forms of organization are often adversarial and appear to be inadequate in increasingly unstable and complex environments. (Jackson, Gharavi & Klobas, 2006)

More recent management approaches seek to achieve self-generating commitment through motivation. It is believed for example that superior performance will develop from commitment developed through strong organizational culture. Thompson (1989) distinguishes simple control from “responsible autonomy”. The more difficult command and control are (for example in the virtual business) the greater becomes the reliance upon self-motivation.

Depickere (1999) argues that teleworking seems to have led to new forms of management, where Leaders seek to build a culture in which the worker independently performs tasks to the required level of quality and completeness. There has been a shift both from behavior control to empowerment and input control, and toward an increase in output control. In this situation, reinforcement of the discipline of work becomes an internalized process imposed consciously or subconsciously by the employee rather than an externalized, superimposed phenomenon. (Jackson, Gharavi, Klobas, 2006)

To know about control over virtual work, it is better to understand how it is that virtual employees continue to “subject themselves” to the expectations, requirements and standards of their employers. direct controls in the form of procedures, reporting, regular phone calls and e-mails, salary incentives, the presence of local teams, clients, stakeholders and regular management trips to audit projects and (more importantly) the people. And indirect, internalized controls in the form of strong professional commitment, personal motivation,

team loyalty, and fear of failure, self-interest and to a smaller extent organizational culture. These controls have different characteristics:

1. They are diverse.
2. They are fluid and complementary, where one form of control is strong, another may be withdrawn.
3. The internalized forms of control appear to have primacy. The more decisive is the commitment which management perceives to be present, the less the significance of formalized direct controls.
4. Remoteness does seem to exclude staff from participation in activities which enhance a sense of belonging and which maintain organizational institutions. It may be that some institutions are more stable and robust in the absence of face-to-face communication.
5. The interactions of some controls with technologies amplify the internal panoptic on in different ways: a telephone call will speak to the loyalty and obligation of the outside staff; an electronic discussion forum will increase staff identification with the organization not by increasing admiration for the culture, but by placing the organization in a position of providing the forum for the self-realization of the individual worker through professional expression and relationships.(Jackson, Gharavi, Klobas, 2006)

Sometimes, in the absence of strict management control, the progress of task execution is managed by either the initiators or by the entire team. Similarly, without formal power resulting from organizational hierarchy, a VT member usually adopt a democratic stance in decision making by providing convincing arguments to persuade others with the aim of reaching a consensus. Sometimes, more experienced members or those with a finer reputation are able to obtain more credit during discussion and decision making. (Tong, Yang, Teo, 2013)

If we want to achieve excellence trough control we must believing that efficiency and control are closely linked influencing each other and this requires a different or even new view on organizational management and coordination. Linking this to the shift from command and control type of organizations to the information based organization; Drucker (1988) argued a set of requirements:

1. The first is to require a clear, simple and common objective which can translate itself into a particular action. This requirement is also strengthened by Mowshowitz (1994) with the goal-orientated structure of Virtual Organizing.
2. The second requirement is focusing on joint performance and let individual available skills and knowledge support the particular goal-orientated action.
3. The third requirement is taking information responsibility by realizing who depends on what information on which moment in time.

These requirements form a vital part of the needed formation strategy. Each actor should be aware of it dependence on information generated by others based on their specific knowledge and skills which they brought to the table. A lack of information provided by other actors could lead to a loss of control in certain parts of the process, decreases the level of organizational trust and brings uncertainty along. Therefore participants in a Virtual

Organization should be able to rely, believe and have faith in each other and assume their personal effort is the same as the efforts of other involved actors (Davidow & Malone, 1992).

1.1.5.3. Leadership Challenges in Virtual organizations

Virtual teams offer high flexibility and other potential benefits, but they also create numerous leadership challenges (Hunsaker & Hunsaker, 2008). Virtual teams face particular challenges involving trust, communication, deadlines, and team cohesiveness (Jarvenpaa & shaw, 1998; Kitchen & McDougall, 1999; Lipnack & Stamps, 2000; Robey et al., 2000; Warkentin et al., 1999). Cascio (2000) states that there are five main challenging facing Leadership of a virtual organization:

- ✓ Lack of physical interaction
- ✓ Loss of face-to-face synergies
- ✓ lack of trust
- ✓ Greater concern with predictability and reliability
- ✓ Lack of social interaction.

A Leader can face these challenges and even turn them into opportunities. Leaders must coach members to move beyond their initial mindset of occasionally asking for advice or sharing ideas , to more of a formal project team mindset with the mission of developing best practices that, when implemented, will help the company's bottom line. In most cases, v-leaders have very limited formal power and must rely on the intrinsic satisfaction their team will derive from seeing their innovative ideas in action. It is also imperative that location supervisors and managers give explicit permission for team members themselves to engage in VO activities.

Cordery at al. (2009) demonstrated the challenges that leaders face in attempting to ensure their long-term effectiveness. A summary of the leadership challenges and leader responses is shown in Table below.

As we can see in the table Communication is one of the biggest challenges in virtual teams. This issue is basically because lack of non-verbal cues, the inability to take advantage of incidental meetings and learning (informal discussion in the mail room),difficulty engaging in spontaneous written communication, and insufficient attention to socio-emotional issues (Hron et al., 2000; Jarvenpaa at al., 1998 ; Lipnack and Stamps, 2000; Warkentin et al., 1999). The challenges of communication technology make more difficult for leaders to manage virtual teams. Because these technologies may catch damage suddenly and it cut off relations among members; this diminishes productivity. State-of-the-art communications technology can boost the capability of teams to collaborate but will not replace for team growth. In this case, leader can play a critical role for team. He/she should transform a tool for communication between members in full calmness.

VO challenges	Leader Responses
Getting started	Ensure core member representation worldwide Resolve tensions between "community" and "problem-solving team" stages Establish mission that is readily understood by the organization
Building engagement	Inspire members to participate in the life of a VO Make sure that the problems that are discussed are of interest to everyone Use goals and recognition as motivation and reward
Finding time	Make each meeting intrinsically interesting by addressing timely and relevant issues Make the virtual meetings efficient by focusing on a limited number of agenda items and ask participants to take responsibility for some pre meeting work Install structure into the life of the team by creating manageable meeting routines
Getting supported	Build and publicize a good business case for resourcing the GVTs Convince top-level and operational management to support the initiative
Enriching communication	Make sure that all information is provided before the meetings Send out agenda before meeting Keep the meetings structured
Building and sustaining relationships	Create a climate of ''psychological safety'' wherein members are confident that their inputs are welcome and appreciated Be aware of national diversity and cultural sensitivities when facilitating discussions at meetings Communicate the rewards of knowledge sharing to break down reticence from culturally diverse members
Getting people to talk (and listen)	Resist the urge to fill the silence Ask specific questions Assign agenda items to various members Use off-line, one-on-one communication to motivate quiet or non participative members Sustain energy among members by soliciting their input for improving team effectiveness
Stabilizing the membership	Continually work to integrate new members into the group, both on an interpersonal level and also in terms of becoming aware of their knowledge and expertise
Demonstrating worth	Get external sponsorship Get commitment from managers at the various locations to try ideas the GVTs had initiated Actively facilitate the transfer of GVT knowledge and solutions to the relevant parts of the organization (i.e., potential customers)

Table 11: Challenges to parallel global Virtual Teams and leaders Responses(Cordery et al. 2009).

Sometimes, members themselves may be a problem in communication process. Information sharing is one of the vital elements of any team. However, some members refuse information and knowledge sharing among team. In this situation, leader must call members to collaboration with together till creates harmony and consensus sensation. One of the main challenges that emerged from the study was "providing clear direction and being able to effectively connect with virtual team members distributed across time zones" (Hanson, 2007).

As we discussed before, there are the two primary leadership functions in virtual teams: performance management and team development. (Bell and Kozlowski, 2002) The challenge for virtual teams is that these functions must be accomplished by leadership substitutes and by distributing the functions to the team itself (Hunsaker & Hunsaker, 2008). V-leaders need to distribute facets of these functions to the team and making it more of a self-managing team. Leaders will need to establish a procedure that members can control their own

performance. They also should extremely observe environmental changes and evolutions, because these can impact on overall outcomes.

One of the other challenging factors where creating and maintain trust in a VO. However we dedicated a section to Trust in Virtual Organizations here we are going to discuss about the idea of clarity and Trust as one of the biggest V-Leader's challenges. Jarvenpaa (1998) notes several factors that may negatively influence trust in global virtual teams. These challenging factors include time, distance, culturally diverse and globally spanning members, and the reliance on computer mediated technology. To boost trust and cover this challenges there are five things a leader should do which suggested and represented by Hunsaker and Hunsaker (2008). These are:

1. Create face time,
2. Set goals and expectations,
3. Provide ongoing feedback,
4. Show-case team members" competence,
5. Foster cultural understandings.

Through the process of work arrangements, Leaders seek increased flexibility, rapid innovation, customer responsiveness, less bureaucracy and improved collaboration (Jackson, 1999). They are also desire lower costs, access to a greater pool of talent, more customer intelligence and higher productivity. A leader on the other hand is responsible to create task flexibility, independence, interesting work and greater opportunities for their employee. Suomi and Pekkola (1999) distinguish between three forms of leadership or management rationality that is applied to virtual work:

- ✓ Strategic (which is assessed in terms of revenue),
- ✓ Economic (which is to improve products or services)
- ✓ Resource-based (which is directed at exploiting the knowledge of staff to the greatest extent).

There are some vital factors which VO leader in particular must pay attention but how about the Leader itself. What are the internal qualities that a leader must have? Here there are some of the factors that important in lifetime of a VO (Oertig, Buergi, 2006). These factors are:

- Selecting creative leaders with a collaborative leadership style and excellent communication skills. Leaders in a matrix organization must be able to lead by influence rather than authority, managing personality issues as well as the functional and cultural mindsets of team members. At the same time they need to keep finding new ways to communicate across time zones and work round geographical barriers.

- Top management need to facilitate face-to-face communication and relationship building. The trend towards ever-increasing use of technology can be efficient and clearly saves costs, but has its price (Meyerson et al., 1996).

- Believing in the value of ongoing investment in language and intercultural communication training. Training is particularly important for new members of project teams working on different continents, to help reduce potential distrust, and allow teams to gel more quickly and work together efficiently.

- The issue of high turnover in project teams, which project leaders report to be a common feature of project teams in many multinational companies. This has a significant negative impact on the building of trust and developing efficiency.

As the summery of this section we are going to mention Davenport & Parson's collection of a To-do list for VO leaders, learned from success and failures of VOs, to face the most important challenges (Davenport & Parson, 1998):

To-Do list learned from Successes:

- ✓ Educate workers on how to be more effective providers and consumers of information.
- ✓ Assess, and train virtual worker management skills.
- ✓ Provide training on personal work strategies in a virtual office environment.
- ✓ Create dialogue and education on how to deal with changed family relationships.

To-Do list learned from Failures:

- ✓ Start with a pilot, but eventually move to a critical mass for benefit realization.
- ✓ Don't put new employees in virtual offices.
- ✓ Set examples with senior managers; move them to the virtual office first.
- ✓ Manage the office space left behind in the traditional office.
- ✓ Make it possible to be exempt from virtual offices with a valid rationale.
- ✓ Allow a return to physical office space.
- ✓ New information flows to replace those lost when workers leave offices and no longer have physical contact.

All of this research suggests four dimensions of effective virtual team leadership:

1. **Communication** (the leader provides continuous feedback, engages in regular and prompt communication, and clarifies tasks);
2. **Understanding** (the leader is sensitive to schedules of members, appreciates their opinions and suggestions, cares about member's problems, gets to know them, and expresses a personal interest in them);
3. **Role clarity** (the leader clearly defines responsibilities of all members, exercises authority, and mentors virtual team members); and
4. **Leadership attitude** (the leader is assertive yet not too "bossy," caring, relates to members at their own levels, and maintains a consistent attitude over the life of the project).

Majchrzak et al. (2000 b) concludes that in the virtual team, the decision-making shifts from hierarchical in nature to more participative due to the adoption of technology. The leader's role becomes more ambiguous in the virtual team in that the leader is not the information gatekeeper but rather a negotiator and facilitator (Majchrzak et al., 2000 b). The same type of

change in the position and roles of the leader of a virtual team is evident in the case study of a virtual team in the automotive industry (May, Carter & Joyner, 2000). The researchers stress that the use of groupware and adoption of it by the virtual team enabled more delegation of responsibilities down to team members. In addition, the uncertainty that members of virtual teams face creates the need for a rotating leadership strategy in order to avoid dependence on any particular member (Jarvenpaa et al., 1998; Johnson, Suriya, Won Yoon, Barrett & La Fluer, 2002).

Altogether as much as we know about virtual organizations in general, we know little about leadership in VOs. How does leadership play itself out in an environment where trust is difficult to build, influence is difficult to express, self-leadership is required, and communication and management are based on ICT technology is often ambiguous (Zigurs, 2003).in the next section we will discuss more

1.1.6. Information Technology

After the dramatic rise of information technology that would bring an enormous revolution in expansion of the World Wide Web, creation of information and communication infrastructures such as: satellites, personal computers, computer networks, internet, e- mail,… also provided a basis for development of virtual organizations. Virtual environments in the global competition persuaded managers to lead their productions from traditional organizations to virtual ones in order to lessen the cost of their investments and the time required to produce new products and result in increasing profitability and employees' satisfaction will.

The use of information and communication technology (ICT), a multicultural workforce, and changing organizational models that increase worker participation have altered the nature of multinational corporations. One of the significant developments in organizational design is the introduction of team-based structures. An example is the virtual organization, of which virtual teams are the building blocks (Watson-Manheim, Chudoba, Crowston, 2002).

Advances in technology facilitate communication and the sharing of information among team members. But, with members in multiple time zones, logistics are more complex. As a result, building trust among team members and overcoming feelings of isolation and detachment becomes a challenge. Thus ICT use in global organizations increases teamwork complexity and may impact its effectiveness (Jarvenpaa, Leidner, 1999).

Researchers have identified differences in technology use and perception of task technology fit between eastern and western cultures. Lee (Lee, 2002) found that patterns of e-mail use vary (probably due to power distance). Massey et al. (Massey, Hung, Montoya-Weiss, Ramesh, 2001) found significant differences in the perception of task technology fit between virtual team members from the United States, Asia, and Europe. On the other hand, no significant influence of cultural diversity on trust was found in virtual teams (Jarvenpaa, Leidner, 1999).

Research on collocated heterogeneous groups that use ICT revealed that heterogeneity and the use of technology had both advantages and disadvantages (Chidambaram, Kautz, 1993; Anderson, 2000). Chidambaram and Kautz focused on the extent to which electronic meeting systems help define common ground; they found that some electronic meeting system structures affected diversity reducing or increasing its impact. For example, the anonymity feature strongly reduced negative aspects of diversity, such as stereotyping, while strongly increasing participation and the meeting quality.

The simultaneity feature decreased distortion in communication and collusion; it strongly increased the number of alternatives, the quality of the process and the decision. The electronic recording and display feature strongly decreased distorted communication; decreased collusion; increased cohesiveness, inclusion, and common ground; and eventually increased the quality of the process and decision. Finally, the process-structuring feature strongly increased conflict management, so that process quality increased. Daily et al. (Daily, Whatley, Ash, Steiner, 1996) found that groups that used group decision support systems (GDSS) outperformed those that did not.

Managing the facilities associated with the virtual office involves deploying new technologies, furniture, and whatever else is needed by the remote worker, providing support activities to remote workers, and managing the office space left behind. Deploying remote offices is usually done in a partnership between the employee who will work in the remote office and the company's ICT framework and facilities organizations. Providing technical support to remote workers also is a key concern to organizations adopting alternative work arrangements. Offering 24 hour a day support, seven days a week can become expensive (Becker & Steele, 1995) and this is the exact place that a good ICT framework can become handy.

Davenport and Pearlson in their 1998 article posed this question that with new set of technology what's happening to the office? Technology has made it possible to redefine where work is done. The traditional notion of an office as the place where someone goes to work seems to be going the way of the buggy whip, the eight track tape, and the stenographer.Virtual Organization is a clear model of successfully replacing offices with technology; portable computers, cellular phones, and fax machines all enable remote or mobile work.

Information technology (IT) improves NPD (new product development) team's flexibility (Durmusoglu & Calantone, 2006). The internet facilitates and improves collaborations and thus increases the performance of new products (Ozer, M., 2004). Furthermore, Ozer (Ozer, M., 2000) concludes that IT undoubtedly has the potentials to significantly improve the new product development activities of industrial companies. The use of virtual teams for new product development is rapidly growing and organizations can be dependent on it to sustain competitive advantage (Taifi, 2007). Davenport & Parsons in 1998 made a list of Enabling Technologies:

Technology	Enabled Work
Lap top computers	Flexibility in where work is performed
High- speed Modems	Remote computers as fast as office-bound computers in retrieving documents
Fax Machines	Paper documents can be sent anywhere.
Voice mail	Voice communications with others even when the receiving parties are unavailable at the time of the call
Cellular data Network	Flexibility in where data communication take place
Email	Send short notes and documents without knowing the physical location of the recipient
ISDN(Integrated Services Digital Network)	Allows voice and data conversations over the same telephone line at the same time. For example one could view a customer record while talking to that customer on the phone.
Cellular Phones	Make real-time voice conversation possible without knowing the physical location of the recipient
pagers	Enable instantaneous contact for low cost
PCS(Personal communication systems)	Make it possible to roam around a building or campus with a low cost phone.
VSAT(very small aperture satellites)	Enables low-cost wireless data transfer between geographically

Table12 : Enabling Technologies in Vos (Davenport & Pearlson, 1998)

Now it is important to know how ICT framework can help VOs in the process of innovation. The Small and Medium sized VOs are one of the sectors that have a strong potential to benefit from advances in Information and Communication Technologies (ICTs) and the adaptation of new business modes of operation (Miles, Snow & Miles, 2000). The use of ICTs can be considered as key factors for innovation and entrepreneurship. ICTs are a must for VOs to innovate (Redoli, et al., 2008).

The success of developed countries can be attributed to factors relating to the emergence of new business technologies and cultures, such as, virtual technology. This constituted the soft-technology complex that provided the environment for innovation and the effective application of technologies (Zhouying, 2005). Developing countries are, on the other hand, characterized by the absence of soft technology and limited abilities to make effective and efficient use of the technologies they obtain through a variety of transfer mechanisms, and to innovate and compete in the global market (Ale Ebrahim, Ahmed, Taha, 2010).

Finally let's discuss about how ICT framework can have effect on architecture of a VO. Nadler and his colleague indicated that the creation of effective architecture hinges on the use of structural materials capable of implementing the architecture and discussed IT's power in creating future organizational architecture. (Nadler & Gerstein, 1992).

1.1.6.1. Appropriate Technology Selection in VO

Simple transmission of information from point A to point B is not enough; the virtual environment presents significant challenges to effective communication (Walvoord et al., 2008). Being equipped with even the most advanced technologies is not adequate to make a virtual organization effective, since the internal group dynamics and external support mechanisms must also be present for a team to succeed in the virtual world (Lurey & Raisinghani, 2001). Table matrix assist the virtual team facilitator choose the appropriate technology based upon the purpose of the meeting. (Ale Ebrahim, Ahmed, Taha, 2009)

Tool	Examples	Use and Advantage	Immediacy	Sensory modes
Instant Messaging and Chat	•Yahoo Messenger • MSN Messenger • AOL Instant Messenger • Skype	• Instant interaction • Less intrusive than a phone call • View who is available • Low cost • Low setup effort	• Synchronous or asynchronous	• Visual • Text and limited graphics
Groupware / Shared Services	• Lotus Notes •Microsoft Exchange •Novell GroupWise	• Calendars • Contact Lists • Arrange meetings • Cost and setup effort vary	•Asynchronous	• Visual
Remote Access and Control	• NetMeeting • WebEx • Remote Desktop • pc Anywhere	• User controls a PC without being onsite • Cost varies • Setup varies	• Synchronous	• Visual • Audio • Tactile
Web Conferencing	• NetMeeting • WebEx • Meeting Space • Go To Meeting	• Live audio • Dynamic video • Whiteboard • Application sharing • Moderate cost and setup effort	• Synchronous	• Visual • Unlimited graphics • Optional audio
File Transfer	• File Transfer Protocol • Collaborative websites • Intranets	• Share files of any type • Cost varies • Moderate setup effort	•Asynchronous	• Varies with file content
Email	• Numerous vendors • free applications	• Send messages or files • Cost and setup effort vary	•Asynchronous	• Visual • Audio in attached files
Telephone	• “Plain Old Telephone Service” (POTS) • Voice Over Internet Protocol (VOIP)	• Direct calls • Conference calls • Cost varies • Low setup effort	• Synchronous •Asynchronous for voice mail	• Audio

Table 13 : tools for virtual team (Thissen, et al., 2007)

Enterprise solutions by leading ERP vendors like SAP and Oracle have their IT solutions covering the three directions of customers, vendors and employees. Oracle’s “unified workplace” provides an integrated architecture to interconnect all the stakeholders of the

organization. Specifically this allows employees, customers and partners to collaborate. (SAP, 2004; Oracle Corporation, 2004; shekhar, 2006)

As leader or top manager of a virtual organization is the person who must chose best task-structure fit ICT framework he or she needs to consider the nature of task when choosing the appropriate communication technology. As Virtual organization staff is distributed across space and don't have the opportunity to participate in face-to-face communication situations while completing tasks. Therefore, matching communication technology used by the team to task demands becomes crucial to the virtual team's ability to operate effectively. (Bell, Kozlowski, 2002). Incorporating what is known about the influence of task complexity on workgroup structure and processes, the virtual leader should choose the team's specific communication media according to the nature of the team's task as follows:

- ✓ **Low-Complexity Tasks:** These situations don't require interdependence or great levels of information exchange between members, therefore asynchronous communication technology (e.g., e-mail or screen sharing) would be appropriate. Research has shown that this type of communication media is very effective for less complex, independent tasks like idea generation because limitations caused by only one member being able to talk at a time aren't present. (Dennis & Valacich, 1993).
- ✓ **High-Complexity Tasks:** These more collaborative situations require greater levels of information exchange between members and interdependence, therefore synchronous communication technology (e.g., video conferencing or groupware) is appropriate. Research has shown that this type of communication media is more effective than asynchronous types for situations requiring decision making of a collaborative nature and greater information exchange because information richness is maintained and members are allowed to communicate more interactively. (Townsend, DeMarie & Hendrickson, 1998)

According to what was said in this section the technology that the VO uses to achieve its tasks should support team social actions. The focus of the social action framework for analyzing groupware (Ngwenyama & Lyytinen, 1997) is the use of IT for communication and creation/use of knowledge among VO members. They suggest the following four social action categories in groupware: instrumental, communicative, discursive, and strategic. Instrumental action focuses on end products by controlling, manipulating, and transforming physical artifacts, such as providing concrete explanations for assignments, distributing readings, and making links to library databases. Communicative action supports creating and maintaining shared understanding among members and is facilitated by computer-mediated communication (CMC). (Shachaf, Hara, 2005)

All said in this section and many other researches that we did not have opportunity to discus about them here, creates an ambiguous image of a "Fit" ICT framework for VOs. Here we will show Strader et al.'s VO ICT infrastructure as figure below (Strader et al. 1998). Here we can see the relationship between the specified components of this information infrastructure that accounts for each of the specifications, and the relationship between the specifications in a VO and will enable effective virtual organization management.

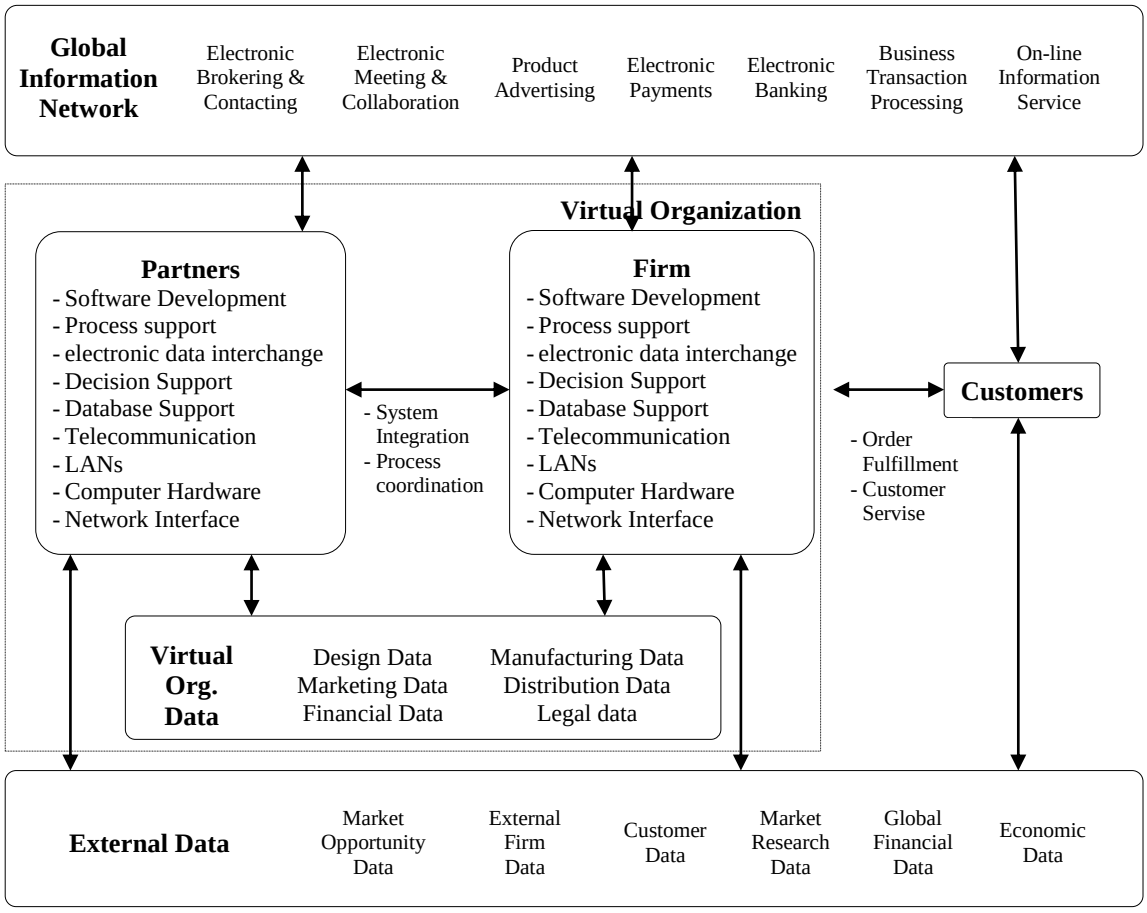


Figure 15: Information infrastructure Framework (Strader et al.1998).

1.1.6.2. Security

The concept of security and its necessity is inseparable from network-based information systems or as we mentioned above ICT framework. It has a particular significance for virtual organizations whose activities either strongly or entirely depend on the network access. The safety level of the VO member organizations and their communication influences security of the entire virtual organization. Diversity of approaches to security issues in different virtual organizations is due to a variety of forms of their activities. VOs are often built upon diverse network infrastructures and on diverse platforms (Voster, 2003). Furthermore, they use different strategies (NIST, 1998) to assure their own security.

Since the whole VO is as secure as its weakest member, each VO member becomes equally responsible not only for its own security, but also for security of common resources and this also increases the stress of employees and complexity of the role. Finding a simple, yet complete definition of the security framework is a real challenge, considering the fact that VO is based on a geographically dispersed information infrastructure, and additionally commonly accessible networks, like the Internet, are used for internal communication within the VO.

The security framework is a set of methods, tools and guidelines that a VO is expected to deploy in order to protect its resources, e.g. data being processed, information on the

organization and its users (system configuration, passwords, etc.), services offered, as well as, the whole infrastructure with its components (computers, network elements, wiring, etc.). An additional requirement is to assure the possibility to efficiently manage elements of the security framework. This includes: design, deployment and execution of the VO own security strategy. (Magiera & Pawlak, 2005)

However, the concept of virtual organizations does introduce its own set of security challenges, as users and resource providers can come from mutually distributed administrative domains and some participants can behave maliciously. These malicious attacks can generally compromise the resource provider node and the shared resources node may be malicious or compromised to harm the user's job running on the supporting platform. (Yates & Orlikowski, 2003)

In the research world Security in virtual organizations (Gui, Xie, Li, Qian, 2004; Golbeck, Hendler, 2004) has attracted increasing attentions from various research communities in recent years. This is due to the unique ability of marshalling collections of heterogeneous computers and resources, enabling easy access to diverse resources and services that otherwise could not be possible without a good computational model. One of the main gaps in researches about security aspect of a VO is to determine measures for this matter Magiera and Pawlak in 2005 determined the following measures that should be undertaken:

- ✓ Foreseeing potential threats and estimating the risk of their occurrence as well as their effects;
- ✓ Determining and implementing of indispensable optimal security measures;
- ✓ Monitoring of the system operation;
- ✓ Detecting cases of security rules infringement and reacting to such cases;
- ✓ Running proper training courses. (Magiera , Pawlak , 2005)

An ICT framework user can belong to any part of the Virtual organizations with a different role (user, client, administrator and so on). But the main problem here is its security, which includes how to identify a user and how to evaluate the actions that a user can perform.

Virtual organizations (Lee, 2005; Niinimaki, et al., 2004), with a kind of ICT framework which allows access to large amount of computing resources, have become increasingly popular. The real and specific problem regarding this type is that underlies the grid concept to coordinate resources-sharing and problem-solving dynamically among multi-institutional virtual organizations. (Cao et al., 2006) in the same manner virtual team working involves exchange and manipulation of sensitive information and data through the Internet, therefore security is always an important issue of concern (Bal & Teo, 2001).

VO leaders should identify the special technological and security level needs of the virtual organization and their team members (Hunsaker &Hunsaker, 2008). After choosing the concept and methodology of security ,VO can established its own virtual security domains that may be completely separate or simply bridge VO stakeholders' security domains. This is required to enable secure service across VO but also requires coordination with the security

policies in stakeholder's organizations. The following security services and related functionalities are required for a VO (Nagaratnam et al, 2002):

Security services	Related functionalities
Trust management service	• Trust relations in VO built on the base of VO agreement • VO Agreement provides an initial base for building trust relations inside a VO. • VO maintains its own Certification Authority (CA) or provides a Bridge CA service.
Policy Authorities	• Policy Authorities provide VO-wide policies related to authorization, trust management, identity federation, mapping of identities, attributes and policies. • Local Policy Authorities may also coexist with the VO Policy Authority; in this case a special policy should define relations between VO and local policies, including mapping rules between policies.
Identity Management Service	• Identity Provider (IP) service or Security Token Service (STS), that may also include: Identity Federation service that provides federated identity assertions for users or resources.
Attribute Authorities	• A VO may also use local Attribute Authorities; in this case a special policy should define mapping rules between VO attributes and local attributes. • A VO Attribute Authority may provide a Pseudonym service for the VO members. • Attribute Authorities can issue attributes bound to users or resources (represented by identities) that can be used for authorization decisions when accessing VO resources or services.
Authorization service	• Authorization service enforces access control to a resource or service based on an entity's attributes/roles and authorization policies. • Authorization service may be split between a policy-based decision-making module and a policy enforcement module aligned to a specific resource or service

Table 14 : Security services and related functionalities are required for a VO

What kind of threats can be a serious danger for VO security and productivity? There are different sources and types of potential threats to VOs security.

- Threats caused by an activity aimed at altering the present state of a system. What we mean is any attempt to break the protection in order to illegally use resources, any interference in the processed data, resulting in the data loss.
- Threats caused by activities not aimed at altering the present state of a system. This group includes eavesdropping and interception attempts which lead to loss of secrecy of the information being processed.
- Threats resulting from various accidents and errors, as well as malfunction of the system.

The first two groups assume the purposeful action aimed at unauthorized access to protected resources and their alteration. A number of techniques are being employed these days to break the protection system (Lockhart, 2004; Peikari & Chuvakin, 2004). The most commonly used techniques are masquerading, eavesdropping, modification of transmitted information, password hacking by force or by a dictionary attack, analysis of traffic in the network, denial of service, code elements modification aimed at gaining access to resources (Burnett,2004), making use of bugs and errors in the security system (McNab,2004), social engineering and Trojan horses (Grimes,2001).

The third group mentioned, apart from system errors contains natural threats such as hardware damage, supply failure, fire, flood, bugs ,crashes, etc. Some of these threats may be eliminated or minimized by a physical protection of the essential system elements. Such basic precautions as room access monitoring, fire protection, emergency power supply, equipment redundancy, backups, should be taken to protect the system. These measures not only protect, but also enable quick restoration of the system. It is much more difficult, however, to eliminate or minimize the effects of purposeful action taken by a third party to break the system security. This is due to a wide range of attack techniques that already exist and new ones that are being created, like: viruses or hacking methods. Apart from a few cases, e.g., denial of service attack or viruses, aggressors try to conceal their trails. Thus, the effects may be unnoticed for a long time. (Magiera, Pawlak, 2005)

With all said regarding security of a VO ,now it is time to see what are the requirements to have secure VO. Florian Kerschbaum and Philip Robinson in their research in 2008 clarified that the distributed, cross-domain nature of VOs serves to make solutions to the security management problem more of a challenge. In order to solve this problem comprehensively, the following conceptual and technical requirements are proposed:

1. Automation of the access control and key management processes for each participant in the VO, such that access controls are enabled and disabled with a least privileges property. A system is said to maintain a least privileges property if and only if for all positive authorizations enabled in the system, there exists at least one task, responsibility or directive to be fulfilled that necessitates the existence and enabling of the respective access control.
2. Autonomy of participating organizations in the VO must be maintained. Participation in a VO should include the signing of contractual agreements and accepting of responsibilities without forcing participants to relinquish the control of their resources, firewall rules, web services, internal policies and internal organization of roles. Delegating the specification, distribution, enforcement and state management of access controls and keys to a central authority or VO manager should be avoided.
3. A minimal amount of networked/remote procedure calls should be required for distributed access control and key management in the VO (Juric et al., 2006).
4. A minimal trusted computing base should be aimed for as the VO and security (access control and key) management solution implemented by each participant. The amount of new trusted software that needs to be either installed at each participant or interconnected with (e.g. via web service interfaces) should be kept to a minimum. The larger the trusted computing base the greater the likelihood of bugs and vulnerabilities being discovered by attackers.
5. Along with the minimal trusted computing base, a single, comprehensive security solution that protects both business and VO management web services is required. Many VO security solutions focus only on the protection of resources and services offered in the VO but treat the protection of the resources and services required for life-cycle and membership management as a separate issue. (Kerschbaum & Robinson, 2008)

1.1.7. Trust

Trust as we seen above, is one of the biggest challenges in Virtual organizations. Whenever any interactions take place between different agents, trust in reputation of agent are significant, especially in the context of virtual organizations in which agents must rely on each other to ensure coherent and effective behavior.

Trust is a bond which keeps the independently working parties together, especially in the absence of any formal controls (Child, 2001; Crossman, Lee-Kelley, 2004; Hunsaker & Hunsaker, 2008). Thus, in the words of Harrington and Ruppel (Harrington & Ruppel, 1999) "a virtual corporation is built on the core competencies, but it is cemented with trust".

Charles Hendy believes that truthfulness is the most important factor in a virtual work setting. The more you move from old centralized organizations to virtual decentralized ones, the less you will have controlling power and management coordination because employees do their activities without being seen during the day by their colleagues and managers. So obviously, it will influence on the employer employee relation. On the other hand it is not possible to establish loyalty and commitment in the staff easily.

Expert people can leave an organization easily to join another one; hence, there will be more competition to achieve these resources than ever before. It seems necessary for virtual organizations to gain a great deal of trust and confidence compared to old organizations, and this may be possible by the reinforcement of leadership skill of managers. Leadership defines future for the staff and unites them while giving a picture of future and establishes confidence among them. (Kaboli et al., 2006)

The concept of "trust" in virtual teams has been widely researched (Espinoza, 1999; Morris, Marshall & KellyRainer, 2002; Robey, Khoo & Powers, 2000; Kanawattanachai &Yoo, 2007). Many dimensions of trust have been identified including cognitive trust, calculative trust and institutional trust (Li, Valacich & Hess, 2004). Studies have been carried out to examine trust in relation to the abilities, benevolence and integrity of team members (Mayer, Davis & Schoorman, 1995) however trust in capabilities is fundamentally different than trust in good-will.

In these researches a correlation has also been established between personal bonding and shared experiences and levels of trust (C. Clases, R. Bachmann, and T. Wehner, 2003).Also they believe that initial trust among a VO members is critical (Robey, Khoo & Powers, 2000). Empirical studies have given support to the concept of swift trust in temporary work arrangements (Meyerson, Weick & Kramer, 1996) and in successful temporary virtual teams (Jarvenpaa & Leidner, 1999).

However, recent findings suggested that building trust in a virtual environment is problematic due to the fact that team members usually have no common past and no future to reference as a base to build trust, and have never even met face-to-face in the past (Greenberga, Greenbergb & Antonucci, 2007; Newell, David & Chand, 2007). In addition, many of the items used to analyze trust in virtual teams overlap with the items used in other

constructs such as relationship building and cohesion. There are some other factors that have often been referred to as "input factors" like culture, design, and technical expertise which has strong effect on trust.(Powell, Piccoli & Ives, 2004)

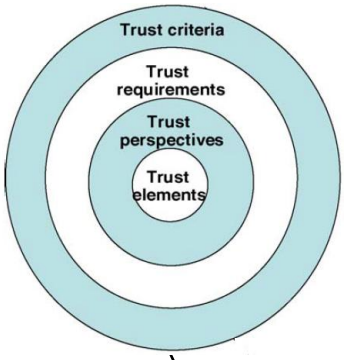
Lipnack et al. believed trust in traditional teams was an important component, but in virtual teams, it is an even more important quality (Lipnack & Stamps, 1997). VO members have to trust other people, share purposes and rewards, and trust their information channels, and VT members have only their shared trust in one another to guarantee the success of their joint work (Lipnack & Stamps, 2000).

This is not only a theoretical claim, but also it is evident in empirical study results, which find that trust accounts for a quarter of the variance observed in virtual team effectiveness. Morris, Marshall and Rainer (2002) found that trust and user satisfaction with the IT used explained 31% of the variance in job satisfaction of virtual team members.

The factors identified as sources of trust in the traditional face to face context were examined in a study of the virtual team setting by Jarvenpaa et al. (1998). They reported that team members act as if trust is present from the first interaction. Explicitly, VOs experience "swift trust," which is temporal and very fragile (Jarvenpaa & Leidner, 1999). The concept of swift trust was developed to describe trust in temporary teams, which form and function around a common temporal task. Swift trust might be imported to the virtual teams but is more likely to be created via the communication behaviors of group members during the first interaction they experience together.

Kanawattanachai and Yoo (2002) examined the dynamic nature of trust and its changing patterns with 38 teams in a simulation game. They focused on cognitive-based trust, which is based on elements such as competence, reliability, and professionalism, and on affective-based trust, which is based on elements such as caring and emotional connection to each other. The study compared both affective-based and cognitive-based trust between high- and low-performing teams over time. They found that both high- and low-performing teams started with similar levels of trust in both cognitive and affective dimensions.

Afsarmanesh and, Camarinha in their 2005 research introduced a rational (fact-based) approach to support the creation of trust within a VO. This approach characterizes trust among organizations as a multi-objective, multi-perspective, and multi criteria subject, where values for trust criteria constitute the facts and past/present performance and achievements of organizations. A set of generic trust criteria is defined for all VOs presented in form of a wheel as shown in Figure below.



Perspective	Requirements	Trust criteria
Structural	Structural strength	Size
		Competencies
		Personnel experts
	Business strength	Centres
		Geographical coverage
		Workload allocation
		Joint ventures
Social	Community participation	Activities participated
		Service contribution
	Community compliance	Standards complied
Economical	Capital	Cash
		Physical capital
		Material capital
	Financial stability	Cash in
		Cash out
		Profit/Loss
		Operational costs
	VO - financial stability	Cash in
		Cash out
		Profit/Loss
	Financial standards	Auditing standards
		Auditing frequency
Technological	ICT- Infrastructure	Network speed (Broadband)
		Interoperability
		Availability
	Technology standards	Protocol standards
		Software standards
		Hardware standards
		Security standards
	Platforms	Operating systems
		Programming languages
	Platform experience	VO based experience
		External project experience
		Duration held
Managerial	Stable management	Years in power
		Management structure
		Frequency of power change
	VO-Collaborative behaviour	VO opportunistic behaviour
		VO successful collaborations
		VO participation as coordinator
	Reliability	Quality
		Adherence to delivery dates

Figure 16 : Trust elements for VO. (Afsarmanesh, Camarinha-Matos, msanjila, 2005)

The wheel of trust represents the three layers of:

1. Trust perspectives (the internal layer of the wheel)
2. Trust requirements (the middle layer of the wheel)
3. Trust criteria (the external layer in the wheel).

It was generally assumed that members only really knew each other if they could put a face to a name. Knowing each other was reported to lead to higher efficiency. Problems were easier to solve if they knew that person on the other side of the line. Once trust was there, people would report problems to the project leader before they became official, so the leader could still do something about them. It is clear that even in VO's with Trust, you save yourself a lot of time and trouble by being able to rely on someone's word (Arrow, 1974). It will take time for newcomers to the company to gain the trust of their colleagues.

Oertig and Buergi in 2006 found out that primarily there is a link between being able to trust people's expertise, their developing knowledge of the company and knowledge of the task. Also a main reason that developing trust and a comfort level is a major challenge in VOs was the high turnover of project leaders, project managers and members. It was considered more difficult to integrate people who joined the team after it had first gelled. The main way of dealing with the high turnover was to keep doing team building throughout the year, to bring everyone back to the same level and up to speed. (Oertig, Buergi, 2006)

Whereas trust is a bond which keeps the parties together in a virtual organization, coordination helps them in successfully managing their relationships (Malone & Crowstone, 1994).Coordination has long been considered as a solution to problems arising from interdependence of organizational units (Curtis, 1989). Therefore, in the case of virtual organization where parties are strongly interdependent for the accomplishment of their tasks, coordination has particular significance (Crossman & Lee-Kelley, 2004; Malone & Crowstone, 1994; Venkatraman, 1995). Coordination in a virtual organization has been discussed by researchers with respect to the role of ICTs (Duarte, Snyder, 2001; Thorne, 2005); trust (Hunsaker & Hunsaker, 2008), and geographical location (Qureshi & Vogel, 2005) etc. Different mechanisms of coordination, therefore, have also been proposed to work with these elements of virtual organization (Yasir et al., 2010). However factors affecting coordination like communication. Leadership and Information technology have been discussed in previous sections.

With all said Trust may be still an elusive factor, but it is critical in the operation of a VO. As Nonaka and Takeuchi (Nonaka, Takeuchi, 1995) point out, "…participants in the (virtual) project should develop a sufficient level of trust among themselves. Building trust requires the use of mutually understandable, explicit language and often prolonged socialization or two-way, face-to-face dialogue that leads to willingness to respect the other party's sincerity".(Larsen & McInerney, 2002)

1.1.8. Virtual Organization Life cycle

After discussing about VO characteristics we need to see what Virtual organizations go through during their life cycle. Although the concept of organizational life cycle have been criticized and this concept is more of a normative matter than scientific but we found some important researches in this field in Virtual organization area.

Figure below is Strader et al.'s four phase's life cycle model. They believed that VO's life cycle is made up of the identification, formation, operation and termination phases (Strader et al. 1998). Each of the phases is made up of two or more major decision processes. The identification phase involves opportunity identification, and opportunity evaluation and selection. These decision processes are sequentially related. The opportunities identified during the identification process serve as an input into the evaluation and selection process. The identification phase ends once the best available market opportunity has been selected to pursue.

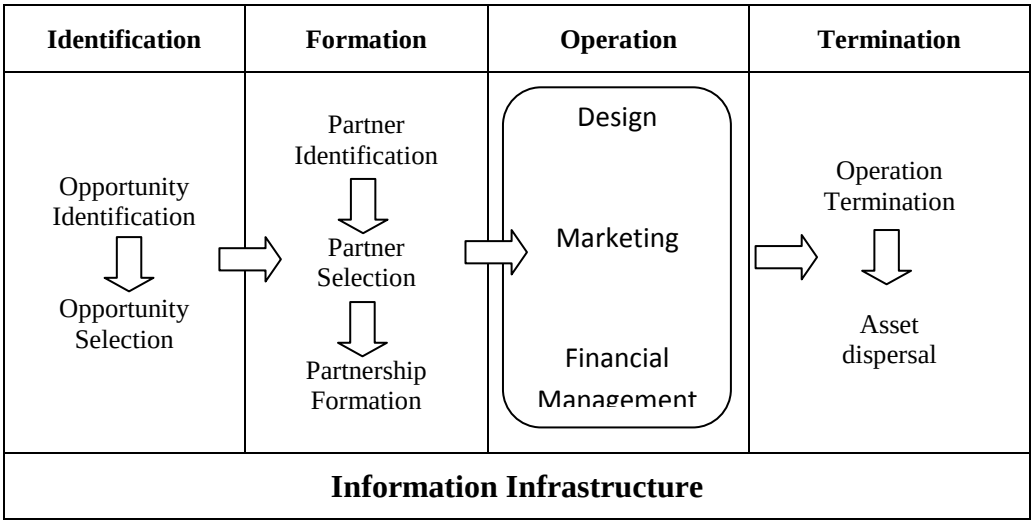


Figure17 : Virtual Organization Life cycle model (Strader et al. 1998)

Information related to the selected opportunity is then input into the formation phase. The major decision processes in the formation phase include partner identification, partner evaluation and selection, and partnership formation. As in the first phase in the organization's life cycle, the decision processes in the formation phase are sequentially related. The partner identification process uses the information from the identification phase as an input and outputs a set of potential partners.

This information is then used as an input into the partner evaluation and selection process. The output of this process is a set of partners selected to work with in pursuit of the market opportunity. The partnership formation process involves the actual formation of these selected firms into the actual virtual organization. Once the organization has been formed, it can begin its operation phase

The operation phase generally involves five different major decision processes including design, marketing, financial management, manufacturing and distribution. In contrast to the relationship between the decision processes in the first two life cycle phases, the decision processes in the operation phase are not sequentially related. Each of the decision processes relies on input and output from the other decision processes on an ongoing basis. This tends to make this phase the most difficult to manage.

The input into this set of processes is all of the information related to the market opportunity and the external alliance partners gathered during the first two phases. The information output from these processes is a summary of all of the activities and transactions that took place during the operation of the virtual organization. The operation phase ends once the market opportunity has passed. Once this has occurred the termination phase can begin.

The major decision processes in the termination phase include operation termination and asset dispersal. As in the first two phases, these decision processes are sequentially related. Current operational information such as inventory levels and orders that have not been completed are input into the operation termination process. Once all of the loose ends have

been tied up the asset dispersal process can begin. The input into this process is all of the accounting and legal information required to terminate all con- tracts and disperse any partnership assets between the organization's firms. Once this has been completed the firms are free to pursue other opportunities and form other partnerships. This essentially means that this particular virtual organization is dead. Thus ends the organization's life cycle. (Strader et al. 1998)

Although last model was one of the widely accepted perspectives, but there is other researchers who focused on different phase and added more details to this process. Camarinha and Afsarmanesh in their 2007 research presented the following model that suggested for the VO creation process: (Camarinha, Afsarmanesh, 2007)

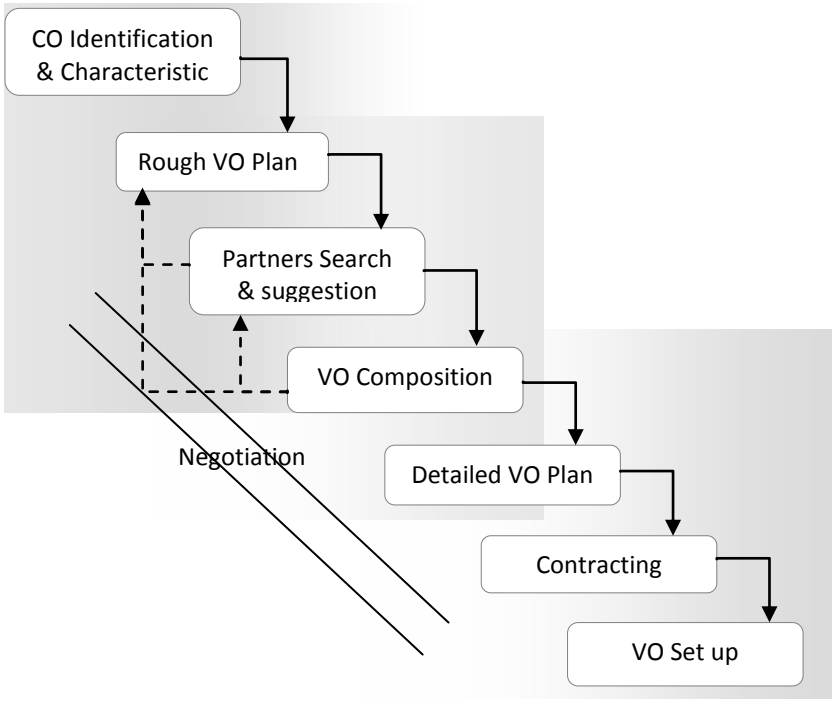


Figure 18 : Simplified VO creation Process

1- Preparatory planning phase:

- ✓ *Collaboration opportunity identification and characterization*: this step involves the identification and characterization of a new collaboration opportunity (CO) that will trigger the formation of a new VO.
- ✓ *Rough VO planning*: determination of a rough structure of the potential VO, identifying the required competencies and capacities, as well as the organizational form of the VO and corresponding roles. At this stage it is important to define the partnership form which is typically regulated by contracts and cooperation agreements.

2- Consortia formation phase:

- ✓ *Partners Search and Suggestion:* identification of potential partners, and their assessment and selection. Issues to consider: elements for search and selection

(technical, economical, reliability indicators, preferences); matching algorithms; (multi-criteria) selection criteria; optimization; assessment (preparedness, etc.), consideration of collaboration history; external search (if the internal offer is insufficient); etc.

- ✓ *Negotiation:* Is an iterative process to reach agreements and align needs with offers. It can be seen as complementary to the other steps in the process and runs in parallel with them as illustrated in model. Important issues to consider at this stage include: determination of the objects of negotiation; negotiation protocols; decision-making process and corresponding parameters; representation of agreements; etc.

- ✓ *VO composition:* when the structure of the VO is finally defined and tasks/ responsibilities assigned to the selected members.

3. VO launching phase:

- ✓ *Detailed VO planning:* once partners have been selected and collaboration agreements are reached, this step addresses the refinement of the VO plan and its governance principles. This step involves the business/collaboration process modeling (depending on the type of collaboration BP, collaborative project, collaborative problem solving, etc.); final VO representation; assignment of roles and responsibilities; definition of sharing principles, access levels (assets/resources, intellectual property, benefits, etc.), preliminary operating policies; etc.

- ✓ *Contracting:* involves the formulation and modeling of contracts and agreements as well as the contracting process itself, before the VO can effectively be launched. In other words, this step is the conclusion of the negotiation process. A contract defines the duties, rights and obligations of the parties, remedy clauses as well as other clauses that are important to characterize the goal of the contract. An agreement is an arrangement between parties regarding a method of action. The goal of this arrangement is to regulate the cooperation actions among partners, and it is always associated to a contract.

- ✓ *VO set up:* the last phase of the VO creation process, i.e. putting the VO into operation, is responsible for tasks such as configuration of the ICT infrastructure, instantiation and orchestration of the collaboration spaces, selection of relevant performance indicators to be used, setting up of the VO governance principles, assignment and set up of resources/activation of services and notification of the involved members.(Camarinha, Afsarmanesh, 2007)

In the beginning of the 1990s, several kind of technologies as distributed systems (Coulouris, 1996) enabled new functionalities for VO creation. The emergence of mechanisms and standards for information interchange, such as EDI (Marks, 1996) and XML (Harold, 1998), also supported the improvement of the VO creation process. Until then, only partial computer-assisted approaches were implemented, and it was only during the integration wave of late 1990s when computer-assisted approaches for VO creation were achieved. During the last decade, several ICT technologies that support VO creation were developed including: electronic business rules for partners' selection process (Goranson,

1999), web-based partners evaluation process (Fornasiero & Zingiaconi, 2004), web-services enabling project planning and scheduling (Nishioka, Kasai, & Kamio, 2003), and diverse VO integration architectures (Busschbach, Pieterse, & Zwegers, 2002; Nishioka et al., 2003).

There another important issue in the Virtual Organization life cycle we will discuss about challenges in every step of a VO lifecycle. Griffith et al. in their 2003 research on ICT based roles and solutions revealed four perspectives on the appropriate management of a VO (Griffith et al., 2003):

- ✓ Creating the right organizational environment (e.g., establishing supportive rewards).
- ✓ Comprising suitably qualified team members who are assigned to appropriate tasks and goals.
- ✓ Monitoring and managing performance progress routinely
- ✓ Executing assigned tasks efficiently and effectively

In traditional organization, team members are only responsible for the last step (i.e., executing the task) while VO experts control over the design of the organizational environment, team initiation, progress management, and performance evaluation. VO members assume control of team initiation, performance management, and task execution, leaving only the creation of a supportive environment (e.g., relevant corporate policy) to organizational management (Griffith et al., 2003). Although these new responsibilities made it much more complicated for VO members but as this kind of organizations are small and agile this characteristic could not reduce the productivity of this kind of firms.

1.1.9. VO Effectiveness

In this section we are going to discuss about factors that can have effect of VO productivity and Effectiveness from Firm's point of view.

The effectiveness measurement is characterized by a number of divergent approaches. Due to the lack of a common framework most of the available theoretical and empirical work cannot be compared, and can, for this reason, hardly contribute to general understanding of the phenomenon. It is therefore important to look trough some researchers approach and apply an established and empirically well assessed theoretical framework. For measuring the effectiveness with modern method, the two following approaches used (Daft & Richard, 1998):

1. S.O.C: Satisfaction of Stakeholder Approach (Constituency Approach).
2. Competing Values Approach.

In the first approach with due constituency, many different activities are integrated together. Customers, employees and companies' owner, partners, Contractors are constituencies here. For determining the VO effectiveness, their satisfactions should be measured. In the company not all the constituencies have the same importance. Because of that, the importance degree of each of the stake holders has been indicated by Analytical Hierarchy process (AHP).

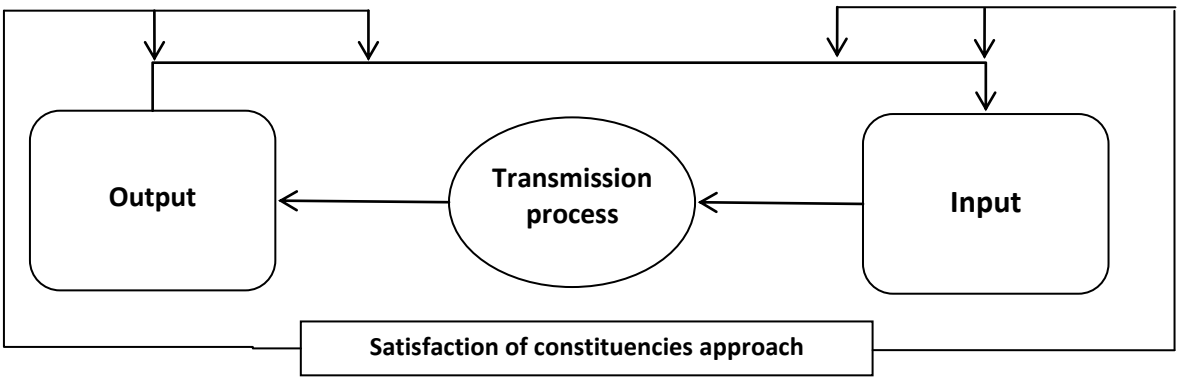


Figure 19 :- Flow Chart of Constituency approach

- ✓ The owner satisfaction must be measured by the ratios of benefit and sale, and comparing them with other factories.
- ✓ The employee's satisfaction must be measured based on Job Descriptive Index (JDI).
- ✓ The customer's satisfaction must be measured by Service Quality Index (SQI).
- ✓ The Contractors and partners' satisfaction must be measured by interviewing them.

The second approach is Competing Values approach which is a framework was developed initially from research conducted by University of Michigan faculty members on the major indicators of effective organizational performance. It has been found to be an extremely useful model for organizing and understanding a wide variety of organizational and individual phenomena, including theories of organizational effectiveness, leadership competencies, organizational culture, organizational design, stages of life cycle development, organizational quality, leadership roles, financial strategy, information processing, and brain functioning. The robustness of the framework is one of its greatest strengths. In fact, the framework has been identified as one of the 40 most important frameworks in the history of business.

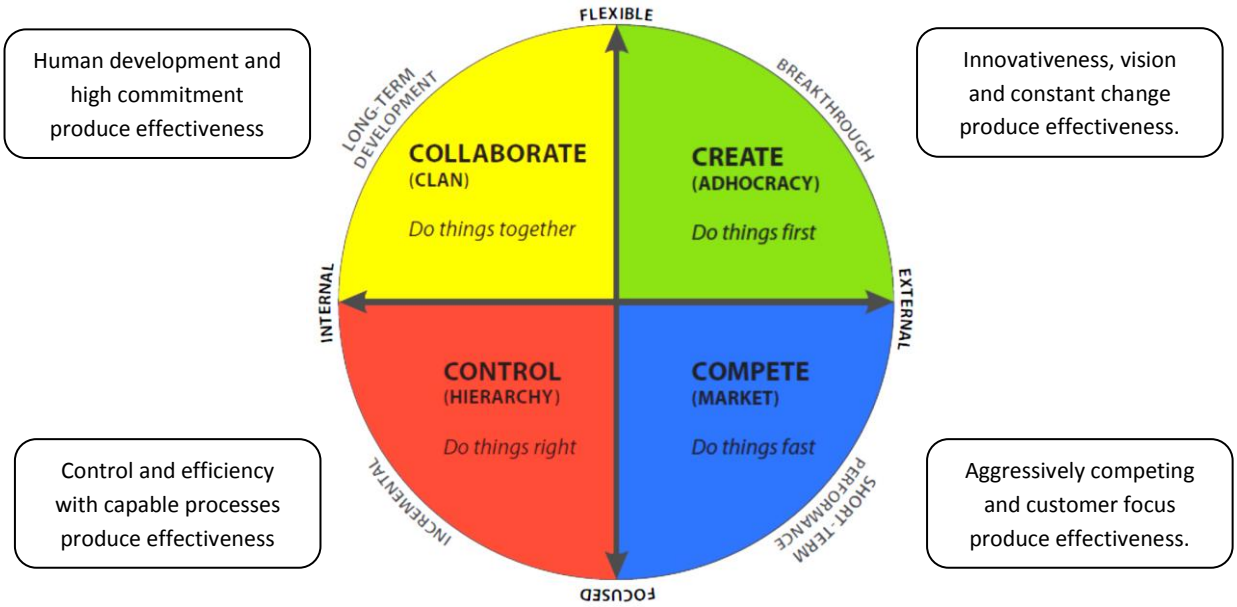


Figure 20 : Competing Values Approach framework and specific Theory of Effectiveness in each area

As a product of power relations, knowledge comprises information, communication, human resources, intellectual capital, brands, etc. (Quintas et al 1997) During the past decade, knowledge capital of a company has been widely acknowledged as a pivotal resource for organizations and undoubtedly, it should be judiciously managed.

One of the other important Strategies for creating an effective VO is Making Computer Mediated Communication More Effective. Interpersonal dimensions, such as enhancing communication and increasing social presence are two areas that impact virtual team effectiveness (Cascio, 2000; Dewar, 2006; Guo, D'Ambra, Turner, & Zhang, 2009; Hill, 2000; Lin, Standing, & Liu, 2008; Ji, Hollenbeck, & Zinkhan, 2008; Powell et al., 2004; Storper & Venables, 2004). In fact, Lin et al. (2008) found that social factors were the most significant predictors of virtual team performance and satisfaction.

Recommendations for enhancing communication include setting ground rules regarding communication frequency, effective qualities of communication, extent of feedback, and knowledge access. According to Dewar (2006), predictable and timely responses between members lead to greater levels of trust in a virtual team. Cascio (2000) also suggests setting times for regular meetings as well as individual accessibility by phone or email, but to avoid relying on email as the sole means of communication. Members should also rely on a common database to store and share knowledge (Hertel et al., 2005; Powell et al., 2004).

In terms of defining effective communication, Guo et al. (2009) found when virtual teams engaged in the dialogue technique, a strategy for developing a shared mental model of effective communication, they reported greater cohesion, communication satisfaction and team decision-process satisfaction than virtual teams who did not use the dialogue technique. Furthermore, virtual teams who used the dialogue technique did not differ from face-to-face teams who did not use the dialogue technique. These results suggest that virtual teams who use the dialogue technique may perform to the level of face-to-face teams (Guo et al., 2009).

Another strategy for improving virtual communication is to increase social presence by allowing members to meet face-to-face (Cascio, 2000; Hertel et al., 2005; Hill, 2000; Lin et al., 2008; Powell et al., 2004; Storper & Venables, 2004). Social presence cues, or another person's presence in a communicative situation, have shown to increase trust, help members form better relationships with one another, and increase perceptions of reciprocity, quality, loyalty and favorability in a CMC environment (Ji et al., 2008; Hertel et al., 2005; Lin et al., 2008; Powell et al., 2004). Powell et al. (2004) found that virtual teams who held early face-to-face meetings formed better interpersonal relationships, trust, respect, socialization and an improved understanding of the project. (Heller R, 2005)

There is another important concept that helps VO's effectiveness that is Knowledge management in virtual organization. The concept of KM is not new in information systems practice and research. It is defined as "a process that deals with the development, storage, retrieval, and dissemination of information and expertise within an organization to support and improve its business performance" (Gupta et al 2000).

The current business environment characterized by radical and accelerating changes has unfolded the limitation of traditional organization to implement complete view of KM. Specifically; KM has been suffering from the traditional organizational control model. The documents as well as the acquired knowledge get lost due to the lack of effective organizational KM; even worse, some documents are accidentally deleted from the resource pool without any awareness or consciousness. As the remedy, a faster cycle of knowledge creation and action should be necessarily implemented (Denison & Mishra 1995). Additionally, KM strategy should be altered and aimed at understanding the presence of knowledge communities and the various channels of knowledge sharing within and between them, and applying ICT appropriately (Malhotra, 2000).

But in the virtual environment, it is of great importance for VOs to harness knowledge in order to stay competitive, innovative and productive. The KM of a VO involves recognizing and managing all of organization's intellectual assets to meet business objectives. It "caters to the critical issues of organizational adaptation, survival, and competence in the face of increasingly discontinuous environmental change. Essentially, it embodies organizational processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings" (Malhotra 1997). Ideally, given a supportive organizational climate and effective KM, a VO could bear on any problem at anytime, anywhere in the world by reckoning on its entire organizational learning and knowledge.

To go back to the big picture of the effectiveness, Ale Ebrahim et al. in his 2009 research suggested factors to measure VO effectiveness as below. Although most of the factors focus of Virtual teams but the approach is to increase the whole VO effectiveness:

- ✓ **Location**: Virtual team allow organizations to access the most qualified individuals for a particular job regardless of their location and provide greater flexibility to individuals working from home or on the road (Bell & Kozlowski, 2002).

- ✓ **Training:** The results of Anderson et al. (Anderson et al., 2007) systematic lab study confirm many of the observations include explicit preparation and training for virtual teams as a way of working collaboratively. Fuller et al., (Fuller, Hardin & Davison, 2006) results indicate that in the case of computer collective efficacy, computer training related to more advanced skills sets may be useful in building virtual team efficacy. The Hertel et al. (Hertel, Geister, Konradt, 2005) suggested that the training led to increased cohesiveness and team satisfaction.

- ✓ **VO Process:** Processes represent the ongoing interaction between group members. It refers to the interdependent actions carried out by members, which transforms inputs to outputs (Gaudes, A., et al., 2007).

- ✓ **Alignment:** Alignment is the degree to which the interests and actions of each employee support the clearly stated and communicated key goals of the organization. The company's processes need to be re-aligned with the capabilities of virtual teams as

opposed to face to face teams. This involves an understanding of the virtual team processes and the existing processes (Bal & Gundry, 1999). However, the key elements in knowledge sharing are not only the hardware and software, but also the ability and willingness of team members to actively participate in the knowledge sharing process (Rosen, Furst, Blackburn, 2007). Literature has shown few organizations are making effective use of good collaborative technologies that are readily available.

- ✓ **Meeting structure:** Proximity enables team members to engage in informal work (Furst, S.A., et al. 2004). Virtual team members are more likely to treat one another formally and less likely to reciprocate requests from one another (Wong & Burton, 2000). Shin (2005) argued that lack of physical interactions and informal relationships decrease the cohesiveness of virtual teams. Formal practices and routines designed to formally structure the task, was reported to lead to higher quality output of virtual team (Massey, Montoya-Weiss, Ting, 2003). The physical absence of a formal leader exacerbates lack of extrinsic motivation (Kayworth, Leidner, 2002). In virtual teams that rarely meet face-to-face, team leaders often have no choice but to implement a formal team structure.

- ✓ **Performance measurement:** Work on the performance of virtual teams by Kirkman and Rosen, et al. (Kirkman, et al., 2004) demonstrates a positive correlation between empowerment and virtual team performance. High performance teams are distinguished by passionate dedication to goals, identification and emotional bonding among team members, and a balance between unity and respect for individual differences. Staples and Webster (Staples & Webster, 2008) showed that the relationship between knowledge sharing and team performance was much weaker for semi virtual teams than for traditional face-to-face teams or purely virtual teams.

- ✓ **Team facilitation:** Virtual team members must have clear roles and accountabilities. Lack of visibility may cause virtual team members to feel less accountable for results, therefore explicit facilitation of teamwork takes on heightened importance for virtual teams. Temporal coordination mechanisms such as scheduling deadlines and coordinating the pace of effort are recommended to increase vigilance and accountability (Massey, Montoya-Weiss & YuTing, 2003).

As we mentioned Shachaf and Hara's model (Shachaf & Hara, 2005) in section 2, setting of the VO is a critical component of organizational effectiveness (Hackman & Oldham, 1980; Pearce & Ravlin, 1987; Shea & Guzzo, 1987; Sundstrom et al., 1990) and is composed of seven dimensions. These seven dimensions are derived from factors that were proposed by other frameworks for traditional organization effectiveness and in particular from the Sundstrom et al. (1987) ecological approach to traditional organization. In addition, Barker's (1968) included additional factors, which are relevant to VO:

- **Geographical locus** (Barker, 1968) is the physical setting of the VO. Space is a critical component of identity and boundary maintenance (Sundstrom et al., 1990). The VO's physical space is used only for temporary collocation (e.g., during face-to-face meetings)

or not used at all for teams who never meet. However, the VO uses a digital space to substitute for the lack of physical space.

- **Temporal locus and duration** (Barker, 1968) are the VO's team's life-cycle and the pace and length of member interactions within the organization. VT development and life cycle are temporal (Vickery, Clark & Carlson, 1999) and members share work time based on the shared digital space.

- **Cultural contexts** (Shea & Guzzo, 1987; Sundstrom at el, 1990) are the cultures surrounding the members at three levels: professional, organizational, and national culture (Schein, 1992; Hofstede, 1991). For example, the culture would affect team norm development, communication, decision making, and performance evaluation (Furst, Blackburn & Rosen, 1999).

- **Technological context** refers to "task technology", which is the technology used for performing the task (Hackman & Oldham, 1980, Shea and Guzzo, 1987; Sundstrom et al., 1990), to media channels and to telecommunication infrastructure.

- **Participation forces** (Barker, 1968) are the environmental factors that motivate members to be part of the VO's teams. The rationale for participation in a VO could be intrinsic, for example, to volunteer (e.g., open source community) or to work under a specific organizational reward system, which involves extrinsic motivation (Hackman & Oldham, 1980; Pearce & Ravlin, 1987; Shea & Guzzo, 1987; Sundstrom et al., 1990).

- **Autonomy and control system** are the degree of independence a virtual team has to conduct its task (Shea & Guzzo, 1987; Pearce & Ravlin, 1987; Sundstrom et al., 1990). For example, high team autonomy means that the team could make decisions in regard to members' roles, without approval from instructors.

- **Training and development support** is the training and consultation the instructors and higher education institutions provide to support members (Hackman & Oldham, 1980; Pearce & Ravlin, 1987; Sundstrom et al., 1990) and performance evaluation (Sundstrom et al., 1990). Studies that focused attention on team member's facilitation (Montoya-Weiss, Massey, & Song 2001; Pauleen & Yoong, 2001; Warkentin& Beranek, 1999) stressed the importance of team building training. VO founders should pay particular attention to this kind of training and providing online courses and institutions.

Although these factors are almost complete, Shachaf (Shachaf, Hara, 2005) suggested two additional components that influence VTE:

✓ *Technology use* (Ngwenyama, & Lyytinen, 1997)
✓ *Internal boundary* spanning (Wenger, 1998)

Unlike other authors (Sundstrom et al., 1990), Ngwenyama, & Lyytinen proposed differentiate task technology and information and communication technology (ICT) and consider technology use not only as a contextual factor, but also as an internal factor, specifically by using a social action framework (Ngwenyama, & Lyytinen, 1997).

If we take a look at effectiveness and performance as a virtual team leader, ability to monitor tasks and perform coaching and development functions becomes impeded when the team goes from operating in a more traditional face-to-face context to an online environment. Because the designated virtual team leader is unable to have full control, responsibilities and leadership functions are dispersed throughout the team. (Aguinis, Simonsen, Pierce, 1998)

Overall, leaders who view their roles as facilitators rather than problem solvers are more likely to foster the capability for leadership in their individual team members (Madsen, 2003). In essence, the VO leader should strive to create more of a self-managing team by implementing a system in which members can regulate team performance and in the big picture create organizational effectiveness. Guidelines for how to accomplish this follow:

- **Provide clear direction with specific individual goals:** Leaders need to be more proactive and initiate much more structure for virtual teams. The virtual team will be more likely to monitor and evaluate its own performance patterns and gather its own feedback when the leader enhances individual self-regulation through goal setting. (O'Reilly, Williams, & Barsade., 1998).

- **Develop routines early on in the VO's life cycle:** The leader should specify beforehand standard operating procedures, train members in these procedures, and provide incentives for compliance with these procedures. Rules and guidelines for member behavior should also be specified at the outset, especially protocol regarding unacceptable e-communication (e.g., uninhibited expression that tends to be associated with computer-mediated communication). (Surinder, Sosik & Avolio, 1997)

- **Closely monitor changes in the environment:** inside of the VO, team members in virtual situations aren't as aware of the dynamics of the overall team environment and the broader situation. The leader should consider how changes in external conditions (e.g., deadlines, changes in team goals or tasks, etc.) might require adaptation and changes within the team (task reassignment to more appropriate individuals, etc.)

- **Facilitate team coherence:** Essentially, organizational coherence is the degree of collaboration and cohesiveness among team members and is further characterized by the degree to which group processes are seamless. Team coherence can be achieved by "…developing linked individual goals, creating a repertoire of team task strategies, and building a compatible network of role expectations across team members."

As discussed above, one of the largest and most obvious challenges that VO leaders face to create effectiveness is monitoring virtual member's performance. The challenge is the inability of managers to physically observe their employees' performance and efforts, and how to implement effective methods for going about measuring productivity, building trust, and managing teams given their particular constraints (Kirkman, Rosen, Gibson, Tesluk, & McPherson, 2002).

If managers are unable to observe their subordinates in action, they are less likely to be able to determine where their employees are struggling and where they excel, rendering the manager unable to provide constructive performance feedback and harness the full potential of their members. As a result, monitoring and measuring performance remain problematic and sources of concern (Kurkland & Bailey, 1999).

As the big picture, Rezgui in 2007 explored VO effectiveness and some of the challenges are as below (Rezgui, 2007):

1. **Newness of Tech:** Team members on projects are affected more by the newness of the technology being used than by the newness of the team structure itself. Technology adoption can have a negative effect on individual satisfaction with the team experience and performance, as also reported in the literature (Kayworth and Leidner, 2000; Van Ryssen and Hayes Godar, 2000). Conversely, when team members are able to deal with technology related challenges, high trust develops (Jarvenpaa and Leidner, 1999).

2. **Software adoption**: The prevailing model for software provision is licensing. However, the licensed software is rarely exploited to its full potential, as end-users tend to use a limited number of available functionality. This, in fact, creates a perception of complexity and can act as a barrier to software adoption.

3. **Data and information redundancy:** This is a real issue as information tends to be owned and managed across individuals, teams, and projects with no particular agreed policy. This leads to severe information inconsistency and regulatory compliance problems, resulting in dramatic financial implications (the problem of defects in Construction has been mentioned several times).This, as noted in the literature (Crampton, 2001; Suchan and Hayzak, 2001), improves communication and cohesion amongst the members of a team, and promotes shared language and mental models across teams.

4. **Tend to be In a Physical location:** A majority of respondents reported that they tend to be tied to a physical location (mainly their office) to do their jobs. For instance, the information available in the form of written specifications and drawings produced during the design stage is required by contractors to construct the building facility. However, access to this information from the Construction site tends to be limited due to the lack of availability of software/hardware resources and network facilities.

5. **More adapted training:** While specialized software training is available, respondents have highlighted the need for continuous training and learning so as to improve their level of ICT awareness and maturity. Adapted training can foster cohesiveness, trust, team work, and commitment to team goals, individual satisfaction, and higher perceived decision quality, as also highlighted in the literature (Warkentin and Beranek, 1999; Kaiser et al., 2000; Tan et al., 2000; Van Ryssen & Hayes Godar, 2000). However, respondents did also report that short time scales, due to simultaneous involvement in projects, creates additional pressure, and leaves little time for training.

6. **Terms of team setting:** while the process involved in setting up a teamwork solution is complex and time-consuming, this team-building exercise is overall perceived as essential in order to establish a clear team structure and shared norms, as confirmed in related literature (Sarker et al., 2001; Suchan and Hayzak, 2001). Early face-to-face meetings during the team's launch phase tend to improve the team's project definition (Ramesh & Dennis, 2002), to foster socialization, trust, and respect among team members (Maznevski and Chudoba, 2000, Suchan & Hayzak, 2001), and to enhance the effectiveness of subsequent electronic communications (Powell et al., 2004).

7. **Clash of cultures on projects:** There is a strong need for the goals of the project to be shared and embraced collectively due to multi-national and multicultural dimension of members. In fact, differences in organizational affiliations can reduce shared understanding of context and can inhibit a team's ability to develop a shared sense of identity (Espinosa et al., 2003).

8. **Bureaucratic and hierarchical culture:** This is important number of respondents (76%) expressed concerns about the bureaucratic and hierarchical culture in their organization, which is in several instances reproduced in teams.

9. **Other:** Issues related to motivation, trust and team cohesion have been raised.

To add more explanation for point number 9, we must say that high motivation levels and job satisfaction are critical success factors in any organizational environment and even more important in a virtual environment effectiveness. It was also suggested that 'participatory' type of culture, with a flat structure, open communication channels, and participation and involvement in decision making, enhances sharing of information and facilitates team cohesion, which in turn promotes trust. These are indeed important problems faced by virtual teams (Alexander, 2000; Kezsbom, 2000; Lipnack and Stamps, 2000; Solomon, 2001). These factors also reported in Kayworth and Leidner (2000) contributes to improve employees' overall satisfaction and job effectiveness.

Regarding the trust, people work together because they trust one another and successful virtual teams pay special attention to building trust throughout their lifecycle (Lipnack and Stamps, 2000). People generally tend to trust people rather than companies and that trust ultimately emerges where communicated information is reliable, people stand by their promises and outcomes equal or exceed expectations. Teams with trust converge more easily (Sarker et al., 2001), organize their work more quickly, and manage themselves better (Lipnack and Stamps, 2000).

In this section we discussed that a VO can be used in variety of settings to enhance the efficiency and effectiveness of systems and motivate managers and participants to reflect on organizational goals. The systemic way of doing things is the advantage that VO has over the ad hoc approaches to organizational structuring and restructuring. Inappropriate use of switching in a computer-based virtual organization can generate a continuous stream of requirement-satisfier pairs that fail to account for changing organizational goals so there is a real need to have a roadmap for VO to see how they can achieve satisfaction and productivity and altogether effectiveness.

1.1.10. Global VO model

In this section we are going to present a global VO model as a result of VO literature Analysis. But first we will take an overlook at 3 other models and analyze them to have a common ground. As mentioned in Virtual Organization section, Travica in his research in 2005 created a clear model called ISSAAC (read as "Isaac") that accounts both for degree of virtuality and VO characteristics. The model is supposed to be used as a vehicle for explaining VO and for assessing the degree of virtualness. ISSAAC dimensions are conceptualized as follows.

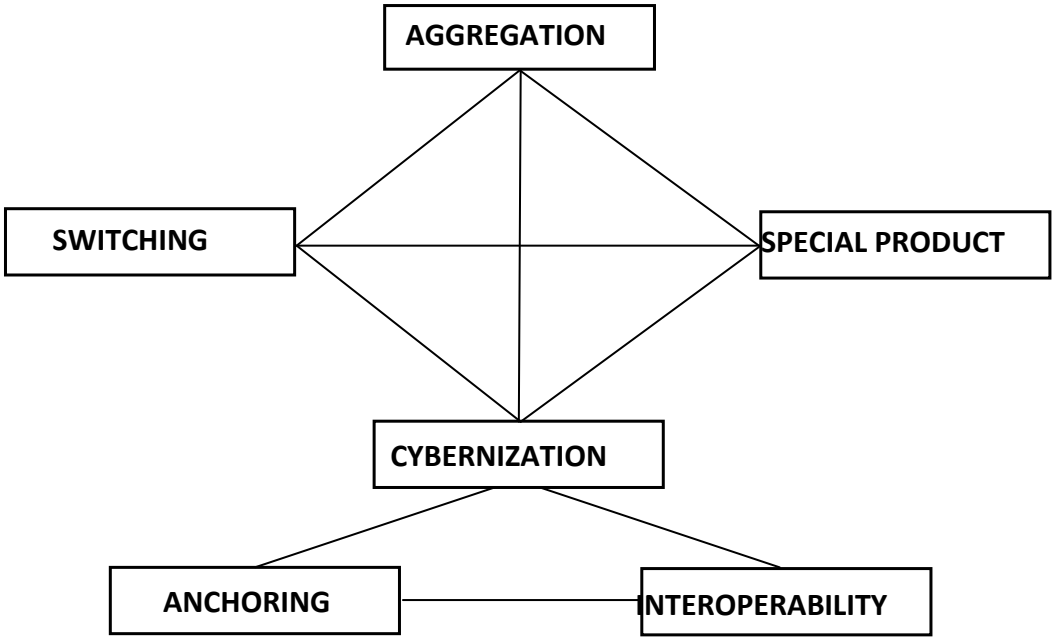


Figure 21: The ISSAAC Model of Virtual Organization

- ***Cybernization*** *(Key Role)***:** refers to an organization's existing in the space that is created by information systems and electronic information flows (cyber space or electronic space). Cybernization reflects the necessary role of IT in VO, accounting for both the extent of IT usage and the involvement of an organization in creating and using computer networks, EDI, technologies for B2B e-commerce, and various relevant information systems.

- ***Aggregation*****:** refers to networking electronically with other organizations and individuals to form a VO. This dimension reflects the electronic network (or networking) character of VO. The term aggregation is intended to connote a typically looser coupling that is expected to exist in a VO.

- ***Switching*****:** refers to the extent to which an organization alternates its membership in VOs over a period of time. This dimension depends importantly on flexible boundaries and electronic linking. Also, Switching is related to the dynamics and scope of Aggregation, and it may be important for delivering non-standard products. Switching helps differentiating between VO and the network organization, as it is not typical for the latter.

- ***Anchoring*:** refers to the support that Cybernization meets in the management, structural, process, cultural, political, and strategic aspects of an organization. Existing in the cyber space through information systems and networks needs to be anchored in the organization of work, management methods, organizational values, etc.

- ***Interoperability*:** refers to the extent to which an organization is synchronized with its partners in a VO. Synchronizing means that members of VO need to be capable of both communicating with each other and working together. Interoperability resembles coordination, but it is different in implying that a more flexible coupling exists among the constituent parts. Interoperability may vary by markets.

- ***Special Product*:** refers to the extent to which an organization delivers non-standard products (goods and services). This dimension reflects the end purpose of a VO; sharing competences and resources could, then, be understood as intermediary goals.

Beside ISSAAC, Shekhar in her 2006 analysis created a model to show directionality and granularity of virtuality .Shekhar believes that Virtuality can manifest itself in different ways. These could include:

1. Outsourcing and off-shoring (Zineldin & Bredenlow, 2003)
2. Virtual linkages with supply chain and other partners (Weber, 2002)
3. Electronic market places (Travica, 2005)
4. E-learning (Englehardt & Simmons, 2002)
5. Virtual communities (Dube et al., 2005)
6. Tele-work (Verano Tacoronte et al., 2003)
7. Virtual teams (Gibson and Cohen, 2003)
8. Technology-facilitated customer management activities (Neuborne, 2003).

Figure below provides a pictorial view of the combined representation of the direction and granularity. When viewed in this manner, it becomes easy to depict the various VO manifestations.

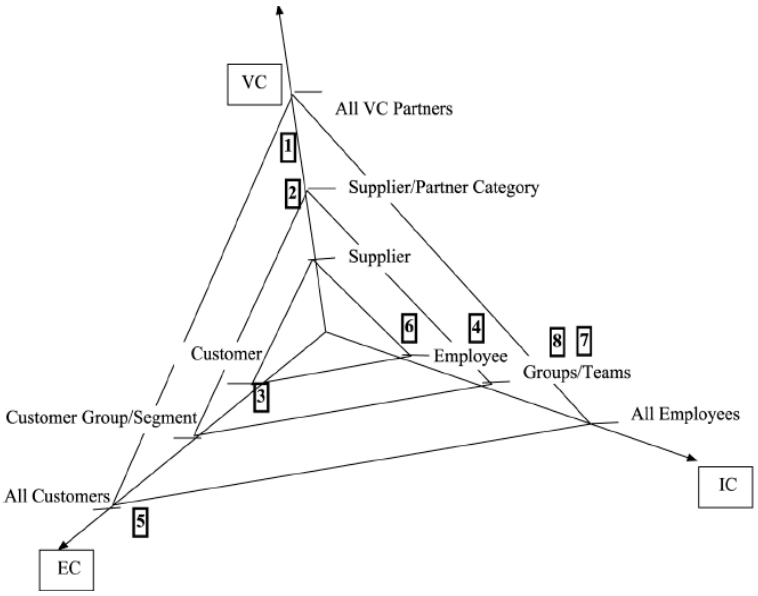


Figure 22: Directionality and granularity of virtuality (shekhar, 2006)

Shekhar analysis of the major manifestations points to the fact that these can be aligned along any one of three directions:

1. The external customer (EC) direction, which would include virtuality with respect to all customer categories;
2. The internal customer (IC) direction, which would include virtuality with respect to employees and other individuals within the organization;
3. The value chain (VC) partner direction that would include inter-organizational linkages with suppliers, alliance partners, subsidiaries, service providers, and so on.

In the next model, IT is in the center of the model, which signifies its central role in VO. IT is critical for carrying out production process at locales of VO as well as linking tasks that are spatially dispersed both through transfer of the work matter and accompanying communication of workers. In addition, IT supports VO structure (the aspect of electronic structure in the research model) whose distinctive elements are the linkages between VO parts dispersed in space (Lucas, and Jack Baroudi, 1994).

IT, furthermore, supports organizational information which can mirror social organization (cf. Nohria and Berkley, 1994). Moreover, IT is also brought into relation with the aspects of virtualness culture. This implies that VO members need to adjust to the dispersed organizational context which precludes socialization processes pertinent to non-mediated contexts. That being the case, it is important to understand how IT influences creation of stories beliefs that bind VO members and parts together? What sort organizing images does the IT-mediated context create in the cognition of VO members? How do VO members cope with the problem of developing trust (cf. Goldman et al., 1995; Handy, 1996)?

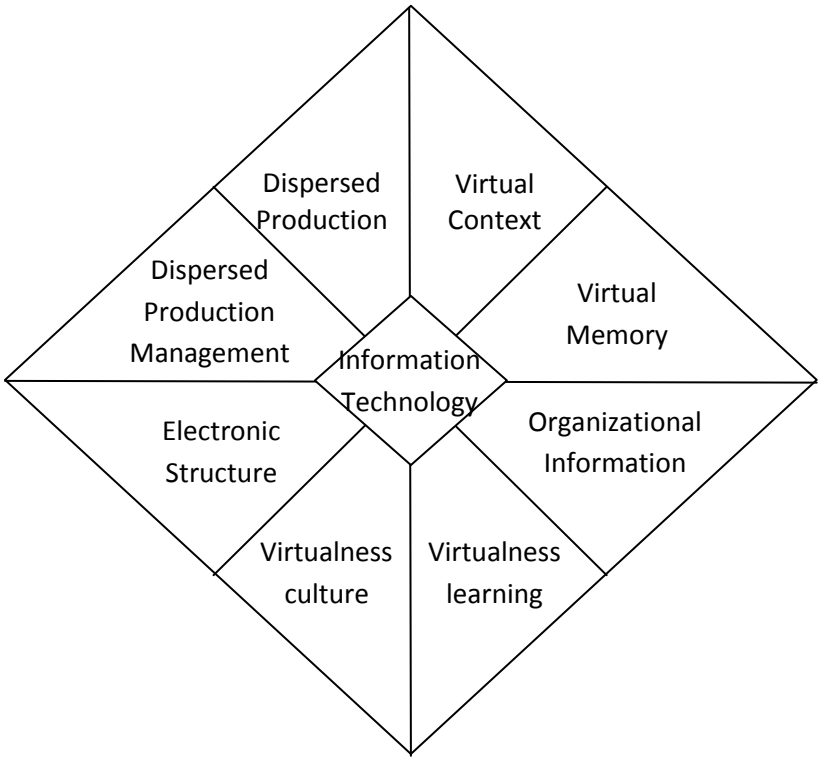


Figure 23: IT as an enabler VO model

Based on these 3 models and Virtual Organization literature review, here we are going to present a global VO model which could be applicable to for any kind of Virtual Organization. We tried to suggest a model which captures all the most important aspects of previous models. We believe that previous models are not 100% covering all the aspect of a VO, plus there is not a clear essence of nature of VO.

As discussed before VO's are the respond to the new era which clarified the necessity of an Agile and flexible kind of organization. Teams building and team releasing concept in this kind of organization should be so quick to prevent any kind of performance reduction. This kind of Organization should be based on and empowered by Information and communication technology. ICT has such an important role that this aspect need to be clearly present in the models. As this kind of firms are mostly founded by 1 or 2 person so presenting the flat structure make it even more important in the model to show leaders and managers how to plan and manage everything from top perpective. So based on what have seen and the literature review we will suggest a global virtual organization model (figure below), as simple as possible just like a VO.

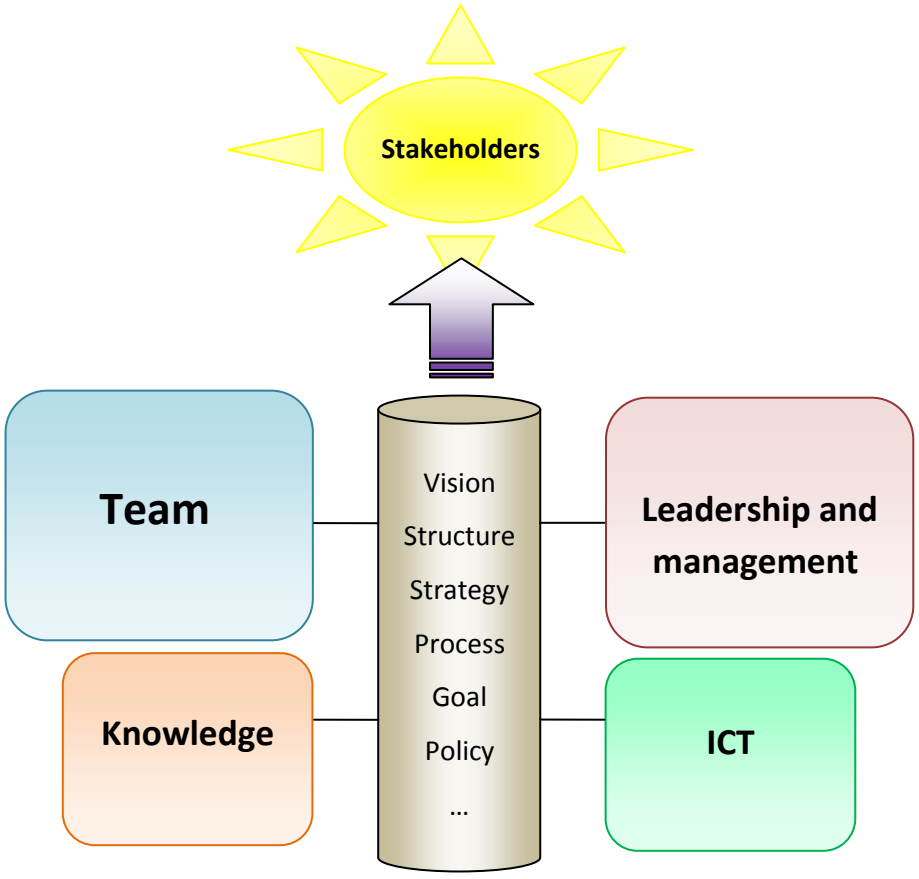


Figure24 : Global VO model (Butterfly model)

We inspired by Nature to form and name this model. As Nature is obviously using a template of sort in the formation of its many individuals. We can see this in the similar structures of unrelated subjects such as a tree, human genealogy, and a lightning bolt. Although these are three totally different things, they all utilize hierarchical organization which branches like a tree. There are many of these seemingly universal patterns which

reoccur throughout the micro and macro world. The existence of these patterns is no mathematical anomaly but an obvious systematic process of organization that occurs naturally throughout the visible Universe.

We consider VOs a nonorganic entity in the world and a butterfly as a full organize one. But there are theories and studies that there are similarities between organic and inorganic structures. For example we can compare humans to snowflakes. It has been said that no two snowflakes are exactly alike. Yet they all have six radial points. The same could be said of humans. No two humans are exactly alike yet we all have the same basic physical anatomy, internal organs, and radial appendages.

Now the question is how a virtual organization would have similarity like a butterfly or function as one of them. Although the main inspiration of this model came from the Organizational theory (Mary Jo Hatch, 2012) which discuses about the idea of Organizations as a replication of nature but here we can discuss about this more.

Virtual organizations are so flat and flexible, agile and light (Anderson, A.H., et al., 2007) just like butterflies. VOs are so sensitive to changes and capable of correcting their speed so quick, these are all same qualities in butterflies. The life cycle of a VO or Virtual team is so short just like butterflies.

Back to the Global Virtual organization model, we discussed that the stakeholders will clarify the main direction and destination of a VO and whenever their interest changed the organization can move in the way to achieve these new destination and goals. According to this model, all of the VOs are an alliance between Management, teams, ICT and knowledge that related together via a specific goal or mission.

Just like the facts in anatomy of butterflies 2 big wings are essential in the life of a butterfly and the small winds help this creature to move faster and change the direction (Nature photonics, 2008). This is the pattern that we tried to imply into this model, Management and teams are 2 factors that a VO cannot live without them but ICT and Knowledge help it to move faster and change the direction.

1.2. Part 2: Models of excellence in Organization

To achieve organizational excellence, companies must focus on aligning and strengthening elements in their structure that represented by the Organization Excellence Models. This model's mission is to support all organizations (businesses, hospitals, government, not-for-profits and schools) attain higher levels of performance. These models refer to an integrated approach to organizational performance management that result delivery of ever-improving value to customers, investors and stakeholders, contributing to organizational sustainability and Improvement of overall organizational effectiveness and capabilities.

In this section we are going to discus about the history of these excellence models and introduce EFQM in detail.

1.2.1. History of organizational excellence models

Since the 1980s, when the total quality management (TQM) concept was firstly defined (Deming, 1986, Crosby, 1980, Juran, 1986), practitioners and researchers alike have broadly defended the positive effects of TQM practices on firms' overall effectiveness and performance. However, although TQM has been clearly conceptualized around basic principles such as consumer focus, continuous improvement and human resource management, there has been a lack of consensus regarding its primary constructs, which prevents comparison across studies and generalizations from the empirical evidence.

The 90s mark the starting point of empirical research on critical factors in TQM, although different studies have yielded different sets of TQM factors (Saraph et al., 1989; Flynn et al., 1994; Powell, 1995; Ahire et al., 1996; Black and Porter, 1996; Zhang et al., 2000; Antony et al., 2002). As a result, there is no single measurement instrument to evaluate TQM implementation. (Santos-Vijande, Alvarez-Gonzalez, 2007)

A variety of definitions of total quality management (TQM) have been offered over the years. Reviewing previous contributions (Dean and Bowen, 1994; Sitkin et al., 1994; Hackman and Wageman, 1995; Wilkinson et al., 1998; Oakland, 2000; Dale, 2003; Eriksson and Garvare, 2005) a dominant insight among experts seems to define TQM as an approach to management characterized by some guiding principles or core concepts that embody the way the organization is expected to operate, which, when effectively linked together, will lead to high performance. (Santos-Vijande, Alvarez-Gonzalez, 2007)

In the other hand total quality management (TQM) may be defined as something that is both complex and ambiguous. Nevertheless, some key elements or principles are common to all TQM models (Dahlgaard-Park, 1999; Reed, Lemark, & Mero, 2000; Sousa & Voss, 2002):

1. Customer satisfaction
2. Continuous improvement
3. Commitment and leadership on the part of top management
4. Involvement and support on the part of employees

5. Teamwork
6. Measurement via indicators
7. Feedback

The core concepts of TQM can be classified into two broad categories or dimensions: social or soft TQM, and technical or hard TQM (Dotchin and Oakland, 1992; Yong and Wilkinson, 2001; Prajogo and Sohal, 2004; Rahman, 2004; Rahman and Bullock, 2005; Lewis et al., 2006).The social issues are centered on human resource management and emphasize leadership, teamwork, training, and employee involvement. The technical issues reflect an orientation toward improving production methods and operations and seek to establish a working method through the establishment of well-defined processes and procedures to make possible the constant improvement of goods and services to customers.

The literature suggests that the optimal management of TQM core concepts will lead to better organizational performance, as studies such as Powell (1995), Terziovski and Samson (1999), Zhang (2000), Hendricks and Singhal (2001), or Kaynak (2003) have verified. The basic theoretical foundation for this relationship is based on the assumption that TQM provides superior value to the customer by identifying customers' expressed and latent needs, responsiveness to changing markets, as well as through improving the efficiency of t he processes that produce the product or service (Reed et al., 1996; Anderson et al., 1995).

Furthermore, evidence concerning the impact of TQM on business performance is also based on a wide range of indicators that differ across studies and are in some cases contradictory, especially regarding financial performance, which is measured in terms of ROA(return on assets) or ROI (return on investment). Some research has found a positive effect of TQM on the latter (Easton & Jarrell, 1998; Hendricks and Singhal, 2001a, b); whereas other research reports a negative incidence of TQM on these measures (Chapman et al., 1997).

TQM is one of the most complex activities that any company can involve itself in; it requires implementing a new way of managing business and a new working culture which not only affect the whole organizational process and all employees but also demand the allocation of significant organizational resources. Firms therefore need to be fully convinced of the trade-offs provided by TQM, particularly if time elapses before the desired results are felt, or if substantial organization stress has to be overcome in the short term to adopt the necessary organizational change (Brah et al., 2002).

And after TQM, different Quality Assurance (QA) models based on the Total Quality Management (TQM) philosophy have been implemented in various countries such as USA, UK, Malaysia and Japan (Kanji & Tambi, 1998; Kanji and Tambi, 1999; Barnard, 1999; Chua, 2004).

Quality award models are a general agreement that a systematic method or framework is needed to put Quality into practice However, there is no universally accepted TQM framework (Yusof and Aspinwall, 2000), and different approaches coexist in the literature,

including consultants-based frameworks (Deming, 1986; Crosby, 1980; Juran and Gryna, 1993), standardized frameworks such as the ISO 9000:2000 series (Askey and Dale, 1994; Tummala and Tang, 1996; Kartha, 2004); and other models based on critical factors of TQM (Saraph et al., 1989; Flynn et al., 1994; Ahire et al., 1996; Grandzol and Gershon, 1998; Dow et al., 1999).

Since the 1990s, most firms have used the models underpinning quality awards, as a framework for implementing TQM initiatives. After introducing Deming Prize in Japan in 1951, the Malcolm Baldrige in the United States(Black and Porter, 1996; Rao et al., 1999; Samson and Terziovsky, 1999; Wilson and Collier, 2000; Pannirselvam and Ferguson, 2001; Prajogo and Sohal, 2004) in 1987 ,the EFQM in Europe in 1991, many countries created their own excellence models with the objective of promoting quality and continual improvement in companies (Bohoris, 1995; Vokurka et al., 2000; Cauchick, 2001; Mavroidis et al., 2007) like the Australian Business Excellence framework (ABE) (Rahman, 2001) and the Singapore Quality Award (Quazi and Padibjo, 1998; Woon, 2000) .

In table in the next page we can see a list of international quality awards and enterprises excellence models and their year of constitution. Appendix F contains more information about the entire quality and excellence model in the world. Based on this table's information, the first ever quality awards was Deming Quality Award in Japan, Asia in 1951. After that in 1984 in North America Canadian Excellence Award was announced and in 1985 International Asia-Pacific Quality Award in China started this process. Regarding the number of excellence award Europe is in the first place with 15 awards and America (North, Center and South) is in the second place with 12 awards.

Many researchers have considered these quality models as operational frameworks for TQM (Bohoris, 1995; Ghobadian and Woo, 1996; Curkovic et al., 2000; Van der Wiele et al., 2000; Yong and Wilkinson, 2001; Lee et al., 2003). These authors consider that quality award models reproduce TQM by capturing its main constituent parts and by replicating its core ideas in clear and accessible language. Nevertheless, the empirical validation of the extent to which these models reproduce TQM is scarce, partial, and limited to some empirical studies such as Curkovic et al. (2000), who conclude that MBNQA and its criteria do capture TQM core concepts. (Bou-Llusar, Escrig-Tena, 2008)

According to Sharma and Talwar (2007), the MBNQA, the EFQM and the Deming prize are an international reference for excellence and have been the pillars of the great majority of models of final 80's and 90's (Bohoris, 1995; Powell, 1995; Cauchick, 2001; Hughes and Halsall, 2002; McDonald et al., 2002; Sharma and Talwar, 2007; Koura and Talwar, 2008; Koura, 2009 ;Curkovic et al. 2000; Wilson and Collier 2000; Pannirselvam and Ferguson 2001; Ghosh et al. 2003; Lee et al. 2003; Flynn and Saladin 2006; EFQM 2008; Bou-Llusar et al. 2009).

Stratus	Name	Country	Year of constitution
Africa	Egypt Quality Award	Egypt	1997
Africa	Kenya Quality Award	Kenya	1999
Africa	Mauritius Quality Award	Mauritania	2001
Asia	Deming Quality Award	Japan	1951
Asia	HKMA National Quality Award	Hong Kong	1991
Asia	Rajiv Gandhi National Quality Award	India	1991
Asia	International Asia-Pacific Quality Award	China	1985
Asia	Iranian National Quality Award	Iran	2002
Asia	Industrial National Quality Award	Israel	2000
Asia	National Quality Award	Sri Lanka	2001
Central America	Dominican Quality Award	Dominican	1996
Central America	National Quality Award of the Republic of Cuba	Republic of Cuba	1999
Europe	EFQM	Europe	1991
Europe	Belgian Excellence Award	Belgium	1992
Europe	British Excellence Award	England	1992
Europe	Finnish Quality Award	Finland	1992
Europe	German Excellence Award	Germany	1992
Europe	Irish Quality Award	Ireland	1992
Europe	Italian Quality Award	Italy	1992
Europe	Príncipe de Asturias Award	Spain	1992
Europe	Swiss Excellence Award	Switzerland	1992
Europe	Wales Excellence Award	Wales	1992
Europe	Danish Excellence Award	Denmark	1994
Europe	Hungarian Excellence Award	Hungary	1994
Europe	Scotch Excellence Award	Scotland	1994
Europe	Austrian Excellence Award	Republic of Austria	1996
Europe	Spanish-American Excellence Award	Spanish-America	2000
North America	Canadian Excellence Award	Canada	1984
North America	Malcolm Baldrige National Quality Award	United Stated of America	1987
North America	National Quality Award	Mexico	1990
Oceania	National Excellence Award	Australia	2000
Oceania	Singapore National Quality Award	Singapore	2001
South America	Management Excellence Model	Brazil	1991
South America	National Quality Award	Peru	1991
South America	Colombian Quality Management Award	Republic of Colombia	1992
South America	National Quality Award	Uruguay	1992
South America	National Quality Award	Argentine Republic	1993
South America	National Quality Award	Republic of Chile	1997
South America	National Quality Award	Aruba	2000
South America	National Quality Award	Republic of Ecuador	2001

Table 15 : International quality awards and enterprises excellence models (Alonso-Almeida, Fuentes-Frías, 2011)

There are many researches about organizational excellence models, Bou-Llusar and Escrig-Tena in 2008, made an analysis of them in the following table.

Authors	Award	Main purpose of the paper	Main relations found
Dijkstra (1997)	Dutch adaptation of the EFQM framework	To analyze the empirical internal structure of the enabler variables	The enablers have a common latent factor that causes the positive associations between them
Eskildsen (1998)	EFQM Excellence Model 1994	To describes a quantitative measurement tool which can provide management with insightful knowledge with regard to TQM practices	Suggest relationship between people, processes, people results and key performance results
Eskildsen and Dahlgaard (2000)	EFQM Excellence Model 1999	To construct a model for employee satisfaction by comparing the EFQM Excellence Model and Hackman & Oldham's Work Design Model	Suggest some linkages between the five-enabler criteria and people results
Prabhu et al. (2000)	EFQM Excellence Model 1997	To review any possible associations between a company's willingness to implement TQM related practices and its resulting impact on the company's performance	Demonstrated three partial linkages: (a) people and people results; (b) leadership and customer results and (c) people-related issues on operational performance measures
Eskildsen et al. (2000)	EFQM Excellence Model 1999	To analyze the relationships between the 9 criteria of the EFQM Excellence Model theoretically and then test these relations empirically	Leadership affects People, Policy and Strategy, and Partnerships and Resources. People, Policy and Strategy, and Partnerships and Resources affect Processes. Moreover, People affect People Results, and Partnerships and Resources influences Society Results. Processes affect People Results, Customers Results, and Society Results. People results and Customers results affect Key Performance Results
Reiner (2002)	Austrian Quality Award(comparable to the EFQM Excellence Model)	To analyze the dependences between the EFQM criteria	There is a direct dependence between the criteria. Confirms the central position of Policy and strategy criterion and the interrelationships between the enabler criteria, and between the result criteria. There is no direct relationship between Processes and Customer satisfaction or between People management and People satisfaction
Bou-Llusar et al. (2005)	EFQM Excellence Model 1999	To provides new insight and understanding of the associations between the EFQM criteria	Focus on the interrelationship between all the elements in the EFQM Excellence Model and conclude that the enablers factor, as a whole, improve results
Calvo-Mora et al. (2005)	EFQM Excellence Model 2003	To analyze the validity and predictive power of the EFQM Excellence Model adapted to the university sphere and to test the relationships implicit in this model	Establishes the relationship (two by two) between the EFQM criteria. The leadership and commitment of the management have a positive influence on people management, policy and strategy and partnerships and resources. Policy and strategy have a positive influence on people management, partnerships and resources and process management. People management has a positive influence on process management. Partnership and resources have a positive influence on process management. Process management has a positive influence on people results and the centre results.
Winn & Cameron (1998)	Malcolm Baldrige National Quality Award 1992	To examine the validity of the proposed relationships among the MBNQA dimensions using data from higher education	They did not validate all the relationships in the Baldrige framework, and they use exploratory analysis to derive an alternative model that was statistically significant. They present a framework showing the direct effects of leadership on each of the four system dimensions and conclude that leadership affects the results by mediating effects through the system dimensions

Curkovic et al. (2000)	Malcolm Baldrige National Quality Award 1997	To assess the MBNQA in terms of its ability to capture the major dimensions of the unobserved variable known as TQM	MBNQA criteria could be summarized into 4 constructs: TQM strategic systems, TQM operational systems, TQM information systems, TQM results. TQM is a second order construct that captures the relationships between the four constructs of the MBNQA
Wilson and Collier (2000)	Malcolm Baldrige National Quality Award 1995	To empirically test the relationships between the Baldrige Award constructs	The underlying theory of the MBNQA is supported. Leadership is the most important driver of system performance and affects financial results through systems elements. Information and analysis is the second most important category. Process management affects customer satisfaction much more than it does financial results
Meyer and Collier (2001)	Malcolm Baldrige National Quality Award Health Care Criteria 1995	To test the causal relationships in the MBNQA Health Care Pilot Criteria A measurement model is also validated	Leadership is a driver of all components of the Baldrige System (information and analysis, strategic planning, human resource development and management, and process management). Leadership and information and analysis are linked with organizational performance resources; while human resource development, management and process management link with customer satisfaction
Pannirselvam and Ferguson (2001)	Malcolm Baldrige National Quality Award 1993	To analyze the validity of the proposed relationships between the categories in the MBNQA, modifying the framework, separating customer focus and satisfaction into two separate constructs	Leadership significantly directly or indirectly affects all of the systems constructs, except for strategic quality planning and information management, which was not tested in the model. The results also indicate that information management, human resources management and customer focus have a significant effect on customer satisfaction and business results. A strong focus on customers and employees, in addition to effective leadership and information management is clearly shown to be essential for organization success
Flynn and Saladin (2001)	Malcolm Baldrige National Quality Award 1988, 1992, 1997	To test the relationships between constructs underlying categories of the MBNQA in 3 editions of the model, and to assess its development	They found that each of the three models was relatively strong, indicating that the Baldrige frameworks all include robust relationships
Goldstein and Schweikhart (2002)	Baldrige Health Care Criteria 1999	To investigate the extent to which the improvement in the 6 first Baldrige criteria leads to improved results	Significant relationships exist among Baldrige categories 1 through 6(leadership; strategic planning; focus on patients, other customer and markets; information and analysis; staff focus; process management) and each of the 5 results between category 7 organizational performance results
Ghosh et al. (2003)	Malcolm Baldrige National Quality Award 2000	To propose and test a structural equation model that empirically validates the relationships between categories of the award	Results support the theory underlying the Baldrige award. Leadership is critical in securing a customer and market focus and strategic planning. Customer and market focus is a crucial input to strategic planning. Strategic planning, mediated by the use of information and analysis and by human resources focus, is the driver of process management.
Lee et al. (2003)	Adapted the MBNQA 2001 as 7 quality management dimensions	To test the link between MBNQA criteria and performance. A survey instrument was developed based on the specific criteria of the MBNQA	The modified model supports the general theory behind MBNQA criteria. Better quality results can be challenged through ‘‘within- the-system’’ quality drivers and quality information and analysis
Winn and Cameron (1998)	Malcolm Baldrige National Quality Award 1992	To examine the validity of the proposed relationships among the MBNQA dimensions using data from higher education	They did not validate the all the relationships in the Baldrige framework, and they use exploratory analysis to derive an alternative model that was statistically significant. They present a framework showing the direct effects of leadership on each of the four system dimensions and conclude that leadership affects the results by mediating effects through the system dimensions

Table 16 : Core concepts which constitute TQM and their embedding in the TQM Framework (Bou-Llusar, Escrig-Tena, 2008)

Also several authors (e.g. Bohoris, 1995; Ghobadian & Woo, 1996; Hendricks & Singhal, 1996; Curkovic et al., 2000; Yong and Wilkinson, 2001) have proposed that models based on quality awards fit the definition of TQM, taking into account its major constituents, and could therefore be considered valid frameworks for TQM. This assumption is based on the correspondence between award criteria and TQM core concepts, as Table below illustrates this fact.

<table>
<tr><th colspan="3">TQM core concepts</th><th rowspan="2">Sila and Ebrahimpour (2002) [a]</th><th colspan="2">TQM frameworks based on Quality award models</th></tr>
<tr><th>Anderson et al. (1994)</th><th>Powell (1995)</th><th>Tummala y Tang (1996)</th><th>EFQM Criteria (2003)</th><th>MBNQA Criteria (2007)</th></tr>
<tr><td>Customer satisfaction</td><td>Closer customer relationship</td><td>Customer focus</td><td>Customer focus and satisfaction</td><td>5. Processes</td><td>3. Customer and market focus</td></tr>
<tr><td rowspan="2">Visionary leadership</td><td>Committed leadership</td><td>Leadership</td><td rowspan="2">Leadership and top management commitment</td><td>1. Leadership</td><td>1. Leadership</td></tr>
<tr><td rowspan="2">Adoption and communication of TQM</td><td>Strategic quality planning</td><td rowspan="2">2. Policy and strategy</td><td>2. Strategic planning</td></tr>
<tr><td>Continuous improvement</td><td>Continuous improvement</td><td>Continuous improvement and innovation</td><td>4. Measurement, analysis, and knowledge management</td></tr>
<tr><td>Process management</td><td>Process improvement
Zero-defects mentality Flexible manufacturing</td><td>Design quality, speed and prevention</td><td>Process management</td><td>5. Processes</td><td>6. Process management</td></tr>
<tr><td>Internal cooperation</td><td>Increased training</td><td rowspan="2">People participation and partnership</td><td>Employee training</td><td rowspan="2">3. People</td><td rowspan="2">5. Workforce focus</td></tr>
<tr><td>Learning Employee fulfillment</td><td>Employee Empowerment Open organization</td><td>Teamwork Employee involvement Everybody’s participation</td></tr>
<tr><td rowspan="5">External cooperation</td><td>Benchmarking</td><td></td><td></td><td rowspan="2">4. Partnership and resources</td></tr>
<tr><td rowspan="4">Closer supplier Relationship Measurement</td><td rowspan="4">Fact-based management</td><td rowspan="4">Quality information and performance measurement</td><td>4. Measurement, analysis, and knowledge management</td></tr>
<tr><td>6. Customer results</td><td rowspan="4">7. Results</td></tr>
<tr><td>7. People Results</td></tr>
<tr><td>8. Society results</td></tr>
<tr><td>9. Key performance results</td></tr>
</table>

a: Summary of core concepts after analyzing 347 survey-based articles published between 1989 and 2000.

Table 17: Different views of the core concepts which constitute TQM and their embedding in the TQM framework (Bou-Llusar, Escrig-Tena, 2008)

Based on this table, the EFQM Model defines more and detailed criteria have to measure the performance and move toward excellence for organizations. This model also defines guidelines and requirements which must be fulfilled in each area of functioning organization, by what it states the special example of the excellence to which one should aim.

As we can see this model is also a tool for self-assessment which gives the organization a picture of its strong sides and potential to improvement (Michalska, Szewieczek, 2007, Ho, 1996).this model also gives a guideline to organizations to establish an appropriate management system regardless of sector, size, structure or maturity, to be successful. The EFQM Excellence Model is a practical tool to help organizations do this by measuring where they are on the path to excellence, helping them understand the gaps, and then stimulating solutions (Karkoszka, Szewieczek, 2007, Urbaniak, 2004).

Based on these reasons, in this research we chose EFQM excellence model as the most recent and complete framework for TQM. In the next section we are going to discuss deeper about EFQM and it fundamental concepts.

1.2.2. European Foundation Quality Management Model (EFQM)

Performance measurement by traditional method is inconsistent with constantly improving thinking. It is difficult to use in practice, its flexibility is low, and it is neglect to meet the needs of customers and cannot be combined with organizational strategies (Wangrassamee, 2003). There are different methods for organizational performance evaluation that each of them has their advantage and disadvantage. If we can run the same approach for organizations and companies, there will be the possibility to compare between them. This approach should be systematic and comprehensive to all performance area in an organization; also it should consider all inputs, process, output and results of activities and their impact on other elements.

Among all other models the EFQM Excellence Model was introduced at the beginning of 1992 as the framework for assessing organizations for the European Quality Award. It is now the most widely used organizational framework in Europe (Eskildsen and Dahlgaard, 2000) and has become the basis for the majority of national and regional Quality Awards. The EFQM Excellence Model is a non-prescriptive framework based on 9 criteria as shown in Figure below. Five of these are “Enablers' (leadership, people, policy strategy, partnership & resources, and processes) and four are 'Results' (people results, customer results, impact on society results and business results).

The term “excellence” is used because the Model focuses on what an organization does, or could do, to provide an excellent service or product to its customers, service users or stakeholders.(Karkoszka, Roszak, 2005; Lancucki, 2001). The EFQM Excellence Model permits on many ways of approach to achieve the permanent excellence in all aspects of the organization activity. (Michalska, 2008)

According to EFQM, the main reason for companies to apply the EFQM Excellence Model is to pursue business excellence through TQM, thereby allowing them to compete successfully in European and global markets. EFQM organization’s mission is:

- ✓ To stimulate and assist organizations throughout Europe to participate in improvement activities leading ultimately to excellence in customer satisfaction, employee satisfaction, knowledge management, impact on society and business results;
- ✓ To support the managers of European organizations in accelerating the process of making TQM a decisive factor for achieving global competitive advantage.

The 'Enabler' criteria cover what an organization does. The 'Results' criteria cover what an organization achieves. 'Results' are brought about by 'Enablers', and 'Enablers' are improved using feedback from 'Results'. The Model, which acknowledges that there are many approaches to achieving sustainable excellence in all aspects of performance, is based on the premise that "Excellent results with respect to Performance, Customers, People and Society are achieved through Leadership driving Policy and Strategy that is delivered through People, Partnerships and Resources, and Processes" (EFQM, 2002).

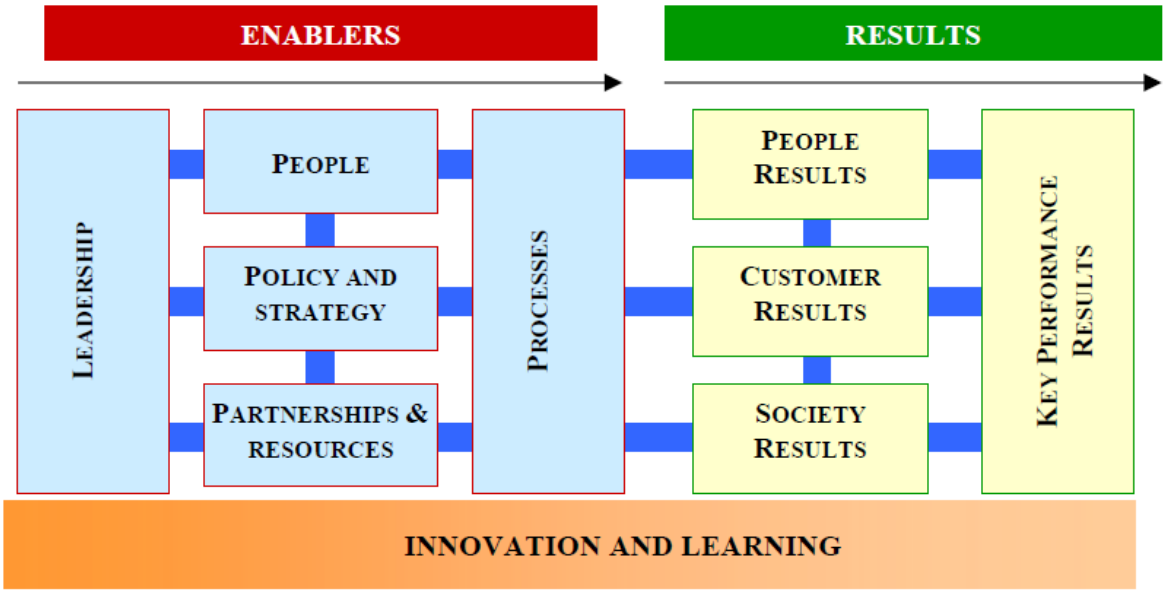


Figure 25 : EFQM Excellence Model

The EFQM Excellence Model was designed to be:

- Simple (easy to understand and use);
- Holistic (in covering all aspects of an organization's activities and results, yet not being unduly prescriptive);
- Dynamic (in providing a live management tool which supports improvement and looks to the future);
- Flexible (being readily applicable to different types of organization and to units within those organizations);
- Innovative.(European Foundation for Quality Management, 2000; Watson, 2002)

Regarding the conceptual side, the EFQM excellence model is a non-prescriptive framework for continuous quality improvement that can be used by any kind of organization, regardless of sector, size, structure, or maturity. The essential elements that constitute the EFQM are the

fundamental concepts of excellence, which are the theoretical conceptualization that supports the model and its contents and structure, which are the nine criteria. The fundamental concepts of excellence are directly and indirectly related to the criteria and sub criteria (EFQM, 2006).

The fundamental concept of excellence is the theoretical framework that constitutes the basis of the EFQM and defines 'Excellence'. This framework has eight generic concepts that provide the theoretical guidelines that should guide the organization. This "Eight Basic Rules of Excellence" that is adapted to the European conditions, the principles of the Total Quality Management (TQM), which implemented in the strategic management process guarantee the success of the enterprise. (EFQM, 2003; Vallejo, et al., 2006; Michalska, 2005 a; Whitmore, 2000; Michalska, 2005 b; Kaplan, Cooper, 2000)

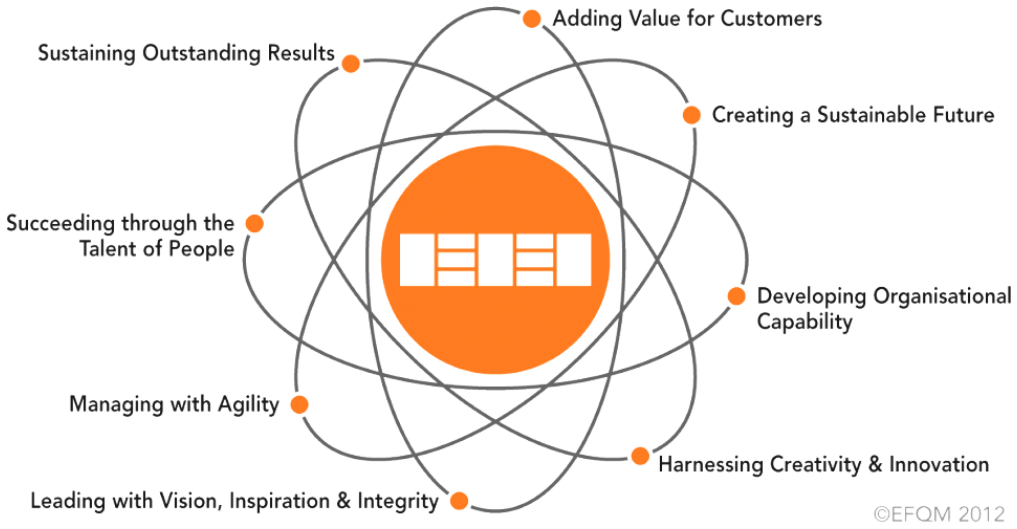


Figure 26: Eight basic rules of excellence

As mentioned in the previous section, roots of the all Business Excellence Models lie in the Quality Management field, where standardization and documentation are an important characteristic. Design of the Business Excellence Model is closely defined, and relatively static-based on generic strategic priorities arrived at using what has been called "plausible logic" (Seddon, 1999). Although the EFQM states that the Business Excellence Model is the equal utility across a wide range of industries from service sector organizations through public sector bodies, research evidence suggests that it has been most widely adopted within manufacturing industries. (Shulver & Lawrie, 2007)

From the beginning, EFQM Excellence Model was established by 14 European large companies (Hides, et al., 2004) and was initially developed as a model to underpin the European Quality Award, called European Model for Business Excellence. Jose´ Ignacio Wert, the former President of EFQM, observed in 2006 that there were around 30,000 European organizations using the EFQM model (Wert, 2006). Regarding the dissemination of EFQM Excellence Awards, the United Kingdom, Spain and Germany ranked among the countries with the greatest number of recognitions. (Heras-Saizarbitoria, Marimon, Casadesús , 2012)

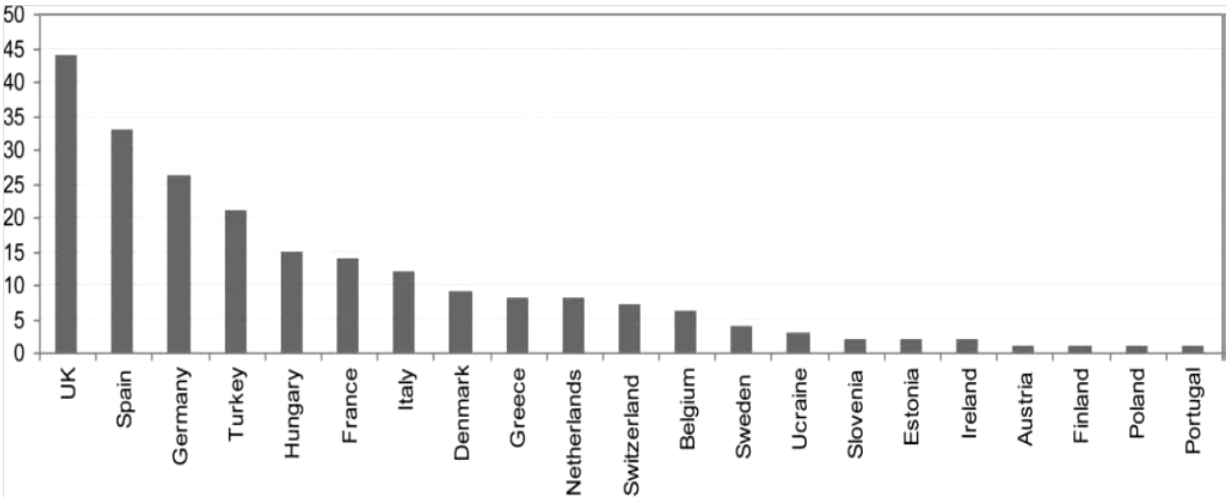


Figure 27 : EFQM Excellence Awards by country, 1992–2009. (EFQM, 2010)

Currently, the EFQM Excellence Model is used by many organizations as a self-assessment and planning tool. In this context it is used to find out where they are, where they want to go and what to improve, and how to get there. The model helps to identify the strengths and areas for improvement and also the actions that need to be taken toward the objective. (Arjomandi, Kestell, Grimshaw, 2009)

Excellent results with respect to performance, customers, people and society are achieved through Leadership driving policy and strategy that is delivered through People Partnership and Resources and Processes (European Foundation for Quality Management, 2003). The arrows of the chart reflect the dynamic nature of the model. Innovation and learning generate feedback for the enablers, producing an improvement in the results. The criteria evaluate the organizational orientation towards excellence. Each of them is divided in a different number of sub-criteria. Lastly, sub-criteria include different areas of improvement. These areas are neither prescriptive nor exclusive.

The global, systematic and open approach of the model is a key aspect. The framework of criteria, sub-criteria and areas of improvement is essential for the continuous improvement of organizations in the never-ending search for excellence. The open character is determined by the continuous search of excellence. This process is unlimited because the areas of improvement are infinite. Organizations and people will always be motivated to achieve continuous improvement. The characteristics mentioned above show that the EFQM model is an optimal orientation not only for excellence but for knowledge governance. (Martin-Castilla, Rodriguez-Ruiz, 2008)

Over the years model has evolved and has kept pace with changes in business environment. Figure below provides key changes made over the years and how the EFQM Excellence model has evolved.

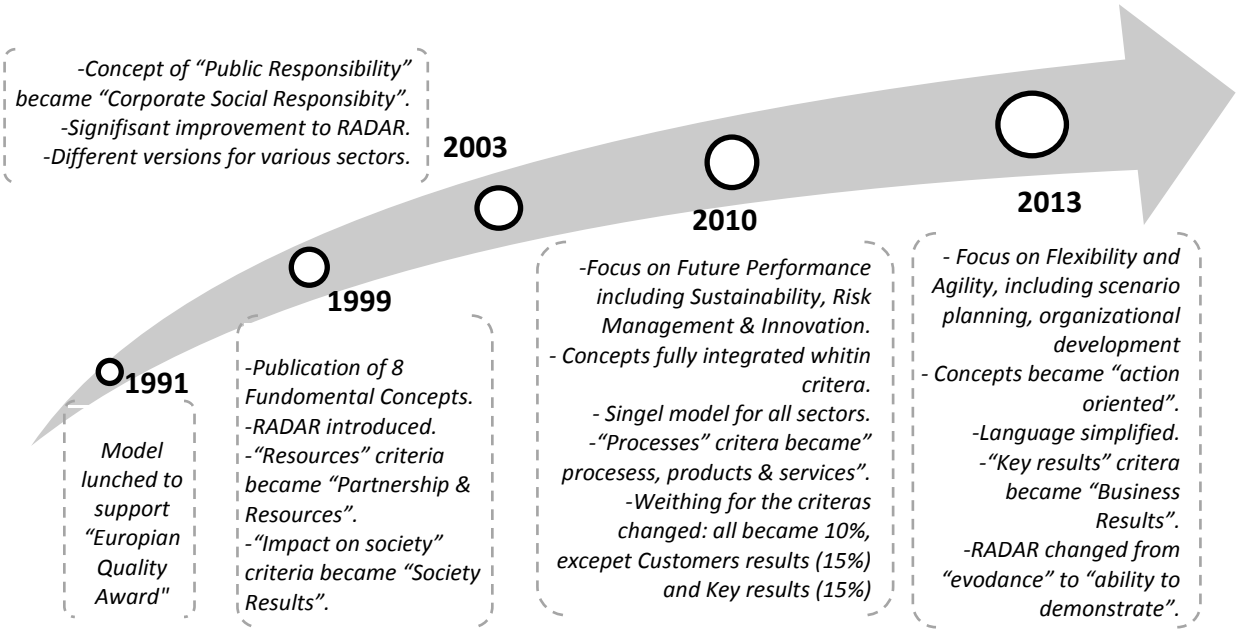


Figure 28 : The Evolution of the EFQM Excellence Model. © EFQM.

Since 1999, The Board CEO asked CEOs, Presidents, and Chairmen across the globe to identify their most critical challenges for the coming year. The top three challenges selected by the 729 respondents to 2013 survey are Human Capital, Operational Excellence and Innovation.

Challenges 2013	Global Rank
Human capital	1
Operational excellence	2
Innovation	3
Customer relationships	4
Global political / economic risk	5
Government regulation	6
Global expansion	7
Corporate brand and reputation	8
Sustainability	9
Trust in business	10

Table 18 : 2013 Global business challenges.

EFQM organization now reviews the EFQM Excellence model every three years to ensure it continues to reflect reality and relevance to the current business environment. The latest "EFQM 2013" version was released in October 2012 based on the survey that showed 2013 global business challenges. The main drivers for changing the Excellence model in 2012 were the need for organizations to be more flexible to compete and succeed within the global economic environment. These changes affected the EFQM 2013 model and they are very well in tune with what executives were looking for. (Thawani, 2013)

There is another strong side to EFQM model .The RADAR framework provides an indication of results achieved for each element. However RADAR is the method for scoring but direct measures will be required to form an assessment and the concept of using balanced score cards is also discussed to supplement the RADAR.

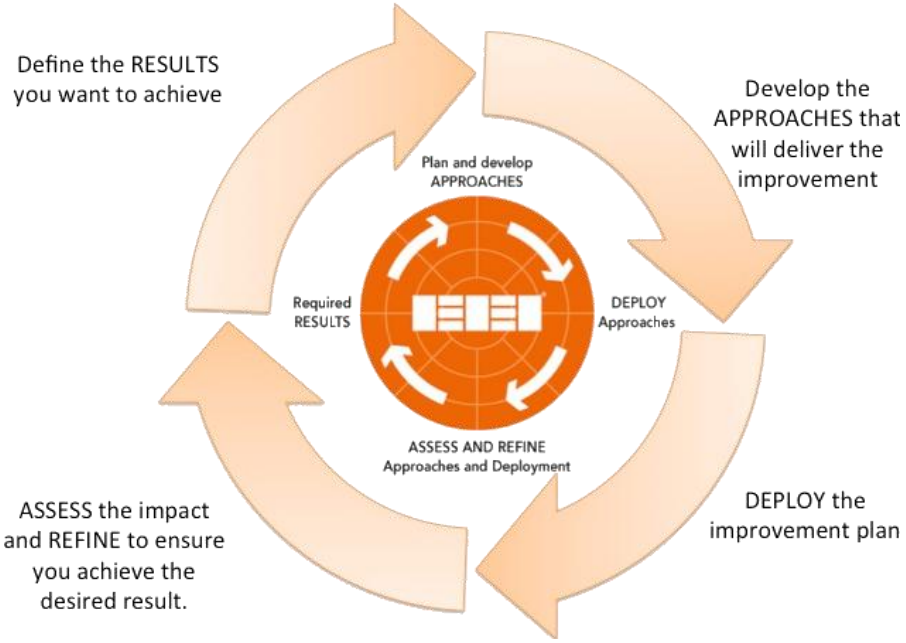


Figure 29: RADAR logic.

RADAR stands for:

- ✓ **R**esults as the organization achievements
- ✓ **A**pproach as the plans and policies
- ✓ **D**eployment as the extent to which the approaches are implemented
- ✓ **A**ssessment & **R**eview covering what an organization does to assess and review both the approach and deployment of approach.

RADAR gives organizations a framework to assist organizations achieve business excellence through continuous improvement in the management and deployment of processes to engender wider use of best practice activities. It enables the calculation of scores against a number of criteria that can be used for either internal or external benchmark comparisons. It is hoped that the results of these relative comparisons will lead to increased focus on improving key process performance, and so generate business excellence.

The RADAR logic is a dynamic assessment framework and powerful management tool that provides a structured approach to questioning the performance of an organization. At the highest level, RADAR logic states that an organization needs to:

- Determine the **Results** it is aiming to achieve as part of its strategy, what are we trying to achieve?
- Plan and develop an integrated set of **Approaches** to deliver the required results both now and in the future, how do we try to achieve this?

- Deploy the approaches in a systematic way to ensure implementation, how / where / when was this implemented?
- Assess and Refine the deployed approaches based on monitoring and analysis of the results achieved and ongoing learning activities. How do we measure whether it is working? What have we learning and what improvements can be made?

RADAR is a simple but powerful management tool that can be applied in different ways to help drive continuous improvement:

- Assessing the maturity of the approaches you have implemented
- Assessing the excellence of the results achieved
- Helping to structure improvement projects

To help support robust analysis, the RADAR elements can be broken down into a series of attributes which contain guidance on what we expect the organization to demonstrate.

In assessing Enablers, we look at the approaches adopted, how they have been deployed and how the organization assesses and refines their efficiency & effectiveness over time. In practical terms, this means we look for:

- Sound and integrated approaches that support the achievement of the organization's strategy
- Structured deployment within all relevant areas of the organization that enables refinements to be implemented within appropriate timescales
- Measurement being carried out so the organization can understand how well the approach is working and how effectively it has been implemented
- Learning activities being undertaken to identify alternative or new ways of working
- Improvements being implemented as a result of measurement and learning (closing the loop)

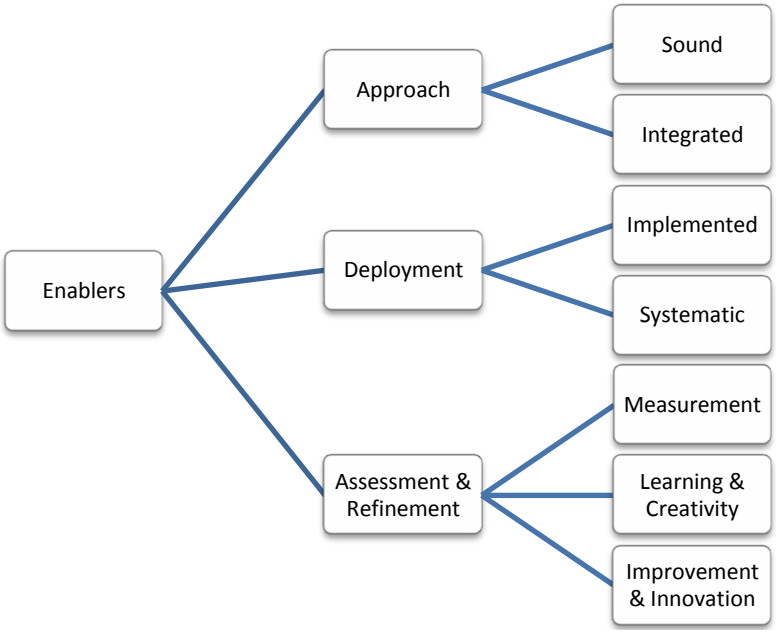


Figure 30: RADAR for assessing Enablers

In assessing Results, we first look at their Relevance to the organization's strategy and how useful they are in reviewing progress against these key objectives. When then look at the performance of the results themselves. In practical terms you should be looking for**:**

- Results which clearly show how the organization is progressing against its key strategies for the criterion
- Reliable data that can be segmented to give a clear understanding of what's happening in relation to different stakeholder groups, products or processes.
- Positive trends over a 3 year period
- Targets, which are appropriate for the strategic objectives, being achieved
- Appropriate comparisons and benchmarks to put the results in context within the organization's operating environment
- Evidence to show that the organization understands the underlying drivers of the results and effectively managing them to ensure that performance levels will be sustained into the future

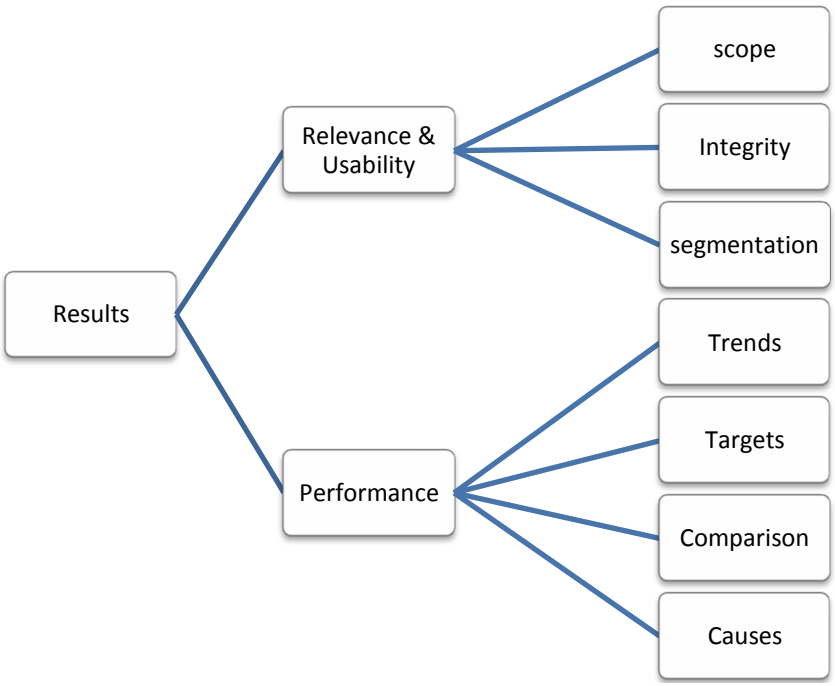


Figure 31 : RADAR in assessing Results

Figure below shows the scoring of RADAR based measurement. Based on this approach there is going to be a matrix to asses Enablers and Results in Organization.

Filling this matrix at the self assessment level and after, drives continuous improvements in processes within an organization. It also helps organization to have information as external benchmark levels of performance of key processes. It also gives a provision of best practice checklists for use within Business Planning and Review activities. With this matrix assessment of the quality of the organizations processes relative to prior years is much easier. Also Identifying areas of poor or low performance against prior years and competitors is much faster and more accurate (EFQM, 1999).

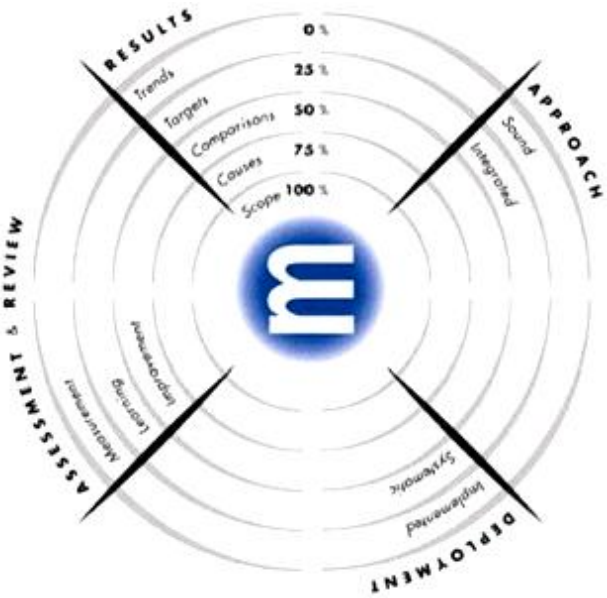


Figure 32: RADAR based measurement scoring matrix for Result

As discussed before EFQM model enables organization to have a deeper look at their own progress by self- assessment .Self-Assessment also enables organizations to determine where they are on their journey towards excellence and plan out the next steps. The simplest tools, such as the Questionnaires, can be completed in an hour. EFQM has developed a number of tools to help organizations complete this process, from simple questionnaire to simulating an EFQM Award Assessment. The key is choosing the right tool; based on how much time, knowledge and resources Organizations have available or how detailed they want the output to be. Figure below shows some of the right tool for assessing organizations:

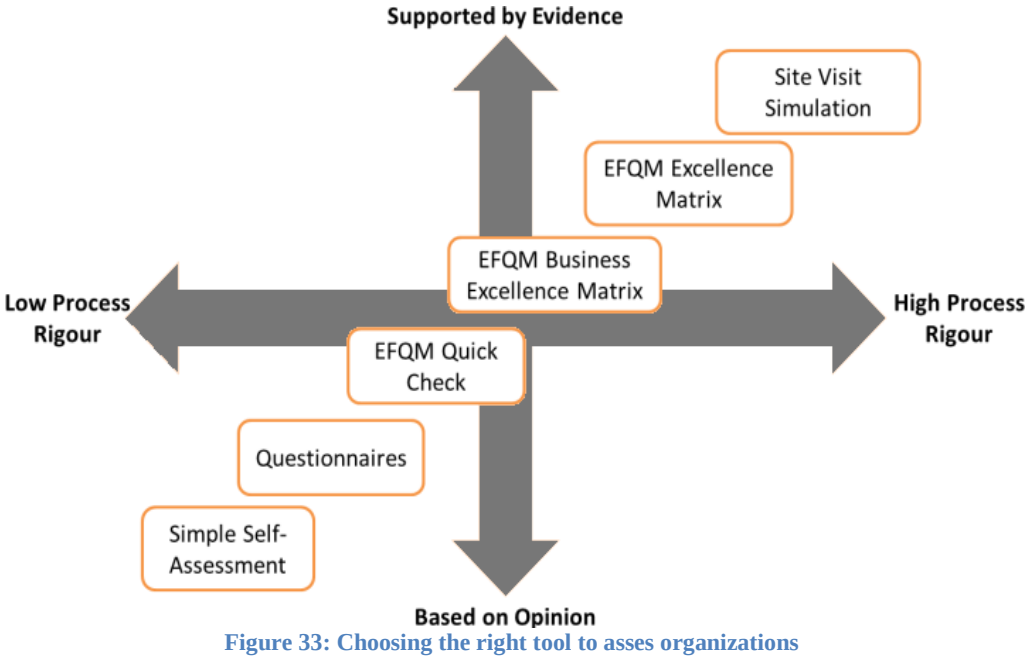


Figure 33: Choosing the right tool to asses organizations

Here are descriptions for some of these tools:

- ✓ **Questionnaires: There** are a number of different questionnaires available, including one that is fully explained in the "EFQM Determining Excellence" publication. Questionnaires ask people to rate their organization against a number of questions, derived for the EFQM Excellence Model.
- ✓ **EFQM Quick check: The** EFQM Quick Check is an Excel-based tool covering 20 standard approaches, aligned to the Fundamental Concepts of Excellence. The tool is designed to look at the extent to which the basic "building blocks" are in place, such as a Strategic Plan, Customer Surveys and Process Management.
- ✓ **EFQM Business Excellence Matrix:** The Business Excellence Matrix (BEM) is the first of the self-assessment tools to provide a reasonably accurate score against the EFQM Excellence Model. It is an Excel- based tool that captures both information about the Enablers and the Results achieved by the organization.
- ✓ **EFQM Excellence Matrix:** The EFQM Excellence Matrix is similar to the BEM but is more comprehensive. The Enablers review up to 90 approaches and the results are segmented into the criterion parts. Again, it is Excel-based. (EFQM.org)

If an organization decided to go for self- Assessment before using any other tools, EFQM has and describes five generic design approaches for self-assessment listed here from the simplest to the most complex: (Shulver & Lawrie, 2007)

1. **The Questionnaire approach**: Self-Assessment using standard questions designed to get the organization started thinking in terms of process improvement. Questionnaires can also be used to facilitate group discussions about improvement opportunities and to inform management workshops.
2. **The matrix chart approach**: Self-Assessment using a matrix chart containing a series of statements of achievement representing each of the nine strategically important areas of the model and each assigned a number of points. An organizations management team normally designs the matrix based on a group discussion forcing team to “articulate their collective vision, and the steps to achieving it in all nine Criteria areas”.
3. **The workshop approach**: Self-Assessment resulting from a “scoring workshop”. After a (self-study) training sequence, and collection of relevant data, the Management group score an organizations performance against the 32 sub-criteria, agree initiatives to undertake that will improve the scores in the following year, and agree some kind of ongoing review process to track the execution of the initiatives.
4. **The pro-forma approach**: External Assessment supported by consultants: key individuals or groups of people fill in a pre-printed page for each of the 32 sub-criteria. Trained assessors or colleagues from different departments could review the results produce lists of strengths and weaknesses that feed into the development of the Business Excellence Model “scores” for the organization.
5. **The quality award simulation approach**: External Assessment driven by a simulation of an application for the EFQM European Quality Award. A specially trained internal report

writing team drives the process, with the report being assessed and scored either by external assessors. This approach involves a great deal of delegation: EFQM itself thinks the main risks associated with this approach being: less involvement of the management team and the "potential for creative writing, covering up real issues". (EFQM, 1999)

Svensson and Klefsjo (2006) warn that, if the organization has not reached the necessary maturity level, it is probably a waste of resources to start a comprehensive self-assessment project. Hides et al. (2004), p. 196) report that the long-term nature of the EFQM Excellence Model makes it unsuitable for "quick fixes" whilst Karapetrovic and Willborn (2001) link the choice of the self-assessment approach to the level of maturity of an organization and the intensity of effort invested in the self-assessment. For example, with a lower effort and at the beginning of the "excellence journey", less complex designs of the questionnaire and matrix-chart approaches are suggested, whereas the award simulation model is recommended for mature organizations with a higher invested effort. Dale (2002) suggests that thought is given to evaluation of this linkage between the TQM maturity of an organization and the self-assessment approach adopted, and the relationship with resources and costs. (Davies, 2008)

Fundamental Concept	Start Up	On the Way	Mature
Results orientation	All relevant stakeholders are identified	Stakeholder needs are assessed in a structured way	Transparent mechanisms exist to balance stakeholder expectations
Customer focus	Customer satisfaction assessed	Goals and targets are linked to customer needs and expectations. Adoption of products offer by the organization is researched	Issues related to stakeholder satisfaction needs are understood, measured and acted on
Leadership and constancy of purpose	Vision and mission are defined	Policy, People and Processes are aligned. A leadership 'model exists	Shared Values and ethical role models exist at all organizational levels
Management by processes and facts	Processes to achieve desired results are defined	Comparative data and information is used to set challenging goals	Process capability is fully understood and used to drive performance improvements
People development & involvement	People accept ownership and responsibility to solve problems	People are innovative and creative in furthering organizational objectives	People are empowered to act and openly share knowledge and experience
Continuous learning, innovation and improvement	Improvement opportunities are identified and acted on	Continuous improvement is an accepted objective for every individual	Successful innovation and improvement is widespread and integrated
Partnership development	A process exists for selecting and managing partnerships	Partners' improvement and achievements are recognized and key external partners have been identified	The organization and its key partners and stakeholders are interdependent. Plans an policies are co-developed on the basis of shared knowledge
Public responsibility	Legal and regulatory requirements are understood and met	There is active involvement in "society"	Societal expectations are measured and acted on

Table 19 : Organizational Maturity Stages

Increased focus on continuous improvements is one of the major benefits that companies experience from the self-assessment process (Porter & Tanner, 1998). This must be linked to an increased focus on employee involvement and employee satisfaction since this is stressed as two of the most important drivers of continuous improvement in most classical TQM literature (Deming, 1986; Juran, 1989; Ishikawa, 1989). Involved and satisfied employees are created by effective people management and this is therefore a primary concern for companies striving for excellence (Oakland & Oakland, 1998; Eskildsen, Kristensen, Juhl, 2000)

Other important element is availability of resources in terms of commitment, time, energy, information and finance (Hides et al., 2004; EFQM, 2003), which will impact on the thoroughness of the self-assessment. Organizational culture also effects self-assessment process (Shih & Gurnani, 1997; Samuelsson & Nilsson, 2002; Sousa-Poza et al., 2001). Education and training relevant to the EFQM Excellence Model and the process of self-assessment (Osseo-Asare & Longbottom, 2002; Owlia and Aspinwall, 1997; Jackson, 2001) is also effective element in self-assessment process.

In the next section there will be deeper focus on each element of the EFQM model and their scoring for assessment.

1.2.3. Elements of Model

EFQM model considers relative performance by an organization in the areas of enabling activities and observed results. It does this using five enabling criteria and four results criteria against a total of 32 standard statements. Scores are attached to the answers to these questions either on the basis of internal Self Assessment or with the assistance of outside assessors.

Scoring system has been designed to allow an organization to benchmark its score against those other firms, or against scores from prior assessments. Also a weighted total of these scores are usually calculated. Wider introduction of quality management systems by an organization tends to improve scores but in general the Excellence Model does not itself provide information on how low scores can be improved. Results are generally produced in report format and circulated, usually on an annual basis (EFQM, 1999).

In EFQM Excellence model 2013(EFQM, 2012) which is the latest version of thesis model, “Enablers” criteria cover what an organization does. “Results” criteria cover what an organization achieves. “Results” are caused by “Enablers”, and feedback from “Results” helps to improve “Enablers”. EFQM gives equal weight to “Enablers” and “Results” as 500 score out of 1000. They are both valued at 50% but each of nine criteria has different weights:

- ✓ Leadership- 10%
- ✓ People- 10%
- ✓ Policy & Strategy - 10%
- ✓ Partnerships & Resources - 10%

- ✓ Processes - 10%
- ✓ People Results - 10%
- ✓ Customer Results - 15%
- ✓ Society Results - 10%
- ✓ Key Performance Results - 15%

The Model, which recognizes many approaches to achieving sustainable excellence in all aspects of performance, is based on the premise that excellent results with respect to Performance, Customers, People and Society are achieved through Leadership driving Policy and Strategy, that is delivered through People, Partnerships and Resources, and Processes (Dudek-Burlikowska ,2007; Sochacki, Michalska, 2007). Here is the linkage between these criteria:

Figure34 : EFQM 2013 Model

The numbers in the parentheses are the points assigned to the nine criteria of the model which shows the extent of achievement of the aims. For example, the number 150 (15%) shows the maximum points in Business Results of the organization. The model recognizes there are many approaches to achieving sustainable excellence in all aspects of performance. (Langroudi, Jandaghi, Mustafa, 2008)

The meaning of each criterion is summarized in Table below. Each criterion is broken down into several sub-criteria and each sub-criterion is illustrated with various ‘‘guidance points’’ exemplifying what the organization has to do in order to develop the criteria. (EFQM, 2003). Appendix A. shows all sub-criteria in each 9 factor in the EFQM model.

Criterion	Definition
Leadership	How leaders develop and facilitate the achievement of the mission and vision, create values required for long term success and implement these via appropriate actions and behaviors and are personally involved in ensuring that the organization's management system is developed and implemented. 1a -How leaders develop the mission, vision and values and are role models for a culture of excellence in the organization 1b -How leaders are personally involved in ensuring the organization's management system is developed, implemented and continuously improved 1c -How leaders are involved with customers, partners and representatives of society 1d -How leaders motivate, support and recognize the organization's people
Policy and strategy	How the organization implements its mission and vision via a clear stakeholder focused strategy supported by relevant policies, plans, objectives, targets and processes. 2a -How policy and strategy are based on the present and future needs and expectations of stakeholders 2b -How policy and strategy are based on information from performance measurement, research, learning and creativity related activities. 2c -How policy and strategy are developed, reviewed and updated 2d -How policy and strategy are deployed through a framework of key processes 2e -How policy and strategy are communicated and implemented
People	How the organization manages, develops and releases the knowledge and full potential of its people at an individual, team-based and organization-wide level and how these activities are planned in order to support its policy and strategy and the effective operation of its processes. 3a -How people resources are planned, managed and improved 3b -How people's knowledge and competencies are identified, developed and sustained. 3c -How people are involved and empowered 3d -How people and the organization have a dialogue 3e -How people are rewarded, recognized and cared for
Partnerships and resources	How the organization plans and manages its external partnerships and internal resources in order to support its policy and strategy and the effective operation of its processes. 4a -How external partnerships are managed 4b -How finances are managed 4c -How buildings, equipment and materials are managed 4d -How technology is managed 4e -How information and knowledge are managed
Processes, Products and Services	How the organization designs, manages and improves its processes to support the policy and strategy and fully satisfies and generates increasing value for its customers and other stakeholders. 5a -How processes are systematically designed and managed 5b -How processes are improved, as needed, using innovation to fully satisfy and generate increasing value for customers and other stakeholders 5c -How products and services are designed and developed based on customer needs and expectations 5d -How products and services are produced, delivered and serviced 5e -How customer relationships are managed and enhanced
Customer Results	What the organization is achieving in relation to its external customers 6a -Perception Measures 6b -Performance Indicators
People Results	What the organization is achieving in relation to its people 7a -Perception Measures 7b -Performance Indicators
Society Results	What the organization is achieving in relation to local, national and international society as appropriate 8a -Perception Measures 8b -Performance Indicators
Business Results	What the organization is achieving in relation to its planned performance 9a -Key Performance Outcomes 9b -Key Performance Indicators

Table 20: The EFQM Excellence Model criteria (EFQM, 2003)

According to the literature, TQM comprises both technical and social dimensions. Enablers embrace the processes, structures and means that the organization can use to manage quality (Nabitz and Klazinga, 1999).Following the categorization proposed by Yong and Wilkinson (2001), Cua et al. (2001) or Rahman (2004), the enabler side of the model is organized by following the distinction between the ‘‘social’’ (soft) aspects and the ‘‘technical’’ (hard) aspects of TQM. According to this classification, Brown (2002) suggests that the social dimension of TQM is represented in the EFQM Model through ‘‘people’’ and ‘‘leadership’’, while ‘‘processes’’ and ‘‘partnerships and resources’’ comprise technical aspects. On the other hand, “policy and strategy” guides the management of the remaining criteria and contains items that relate to both soft and hard issues (Black & Porter, 1995).

Reiner (2002) provided empirical evidence about the central position of the ‘‘policy and strategy’’ criterion in the EFQM Excellence Model, which constitutes a tool for integrating the content of the rest of criteria. In this vein, Castresana & Fernandez-Ortiz (2005) posit that ‘‘Policy and Strategy’’ captures the organization’s efforts to develop a stakeholder-based strategy taking into account the characteristics of the market and sector in which the firm operates. For the holistic interpretation of TQM in the EFQM Excellence Model, the internal structure of the EFQM model should also reflect the holistic character of the TQM initiatives and consider the interrelationships in both the enabler and the result criteria. (Bou-Llusar, Escrig-Tena, 2008)

Here we are going to discuss about the inter relations between factors inside of model. In the literature, there are two types of studies related to the internal relations of the EFQM model. A first group, which include to Westlund (2001), Bou-Llusar et al. (2005) and Bou-Llusar et al. (2009), analyzes relationships between agents criteria and results criteria. In this regard, Westlund (2001) find that the key overall results of the EFQM model are caused jointly by the other three performance criteria of the model.

Bou-Llusar et al. (2005) analyze how agents impact on results, confirming that facilitator’s agents, as a set, improve results. In a more recent study (Bou-Llusar et al., 2009), group facilitator agents into “social” and “technical” and measure their impact within the four types of results–customers, people, society and key- of the model. They conclude that the social agents have a stronger effect on results than the technical ones. They also find that within results agents, society results are the criteria less related with key results.

The second group of papers is focused in analyzing the relationships amongst EFQM enablers and results (Eskildsen & Dahlgaard, 2000; Calvo- Mora et al., 2006; Martínez-Lorente et al., 2009; Sadeh & Arumugam, 2010; Gómez-Gómez et al., 2011). In more recent studies, using a canonical correlation analysis find out that, globally, agent criteria improve results criteria. (Gómez, Costa, Rafael, Lorente, 2012). Gomez et al. proposed that there are more relations between EFQM criteria in the model .Table below shows a summary of some other relationships between criteria in some of studies in this area.

Relationships	Reference in previous researches
Leadership -Processes	Flynn et al. (1994), Wilson & Collier (2000), Woon(2000)
Leadership -Customer Results	Badri et al. (2006), Wilson & Collier (2000)
Leadership -People Results	Badri et al. (2006), Wilson & Collier (2000)
Leadership -Society Results	Badri et al. (2006), Wilson & Collier (2000)
Leadership -Key Results	Samson & Terziovski (1999), Sun (1999) & (2000)
Strategy -Customer Results	Martínez-Lorente et al. (2009)
Strategy -People Results	Sadeh & Arumugam (2010)
Strategy -Society Results	Martínez-Lorente et al. (2009)
Strategy -Key Results	Evans (1997), Terziovski and Dean, 1998
People -Customer Results	Sadeh & Arumugam (2010), Martínez-Lorente et al. (2009)
People -People Results	Martínez-Lorente et al. (2009), Eskildsen & Dahlgaard (2000)
People -Society Results	Martínez-Lorente et al. (2009)
People -Key Results	Sun (1999), Samson & Terzviovski (1999)
Partnerships and Resources-Customer Results	Sadeh & Arumugam (2010)
Partnerships and Resources -Key Results	Martínez-Lorente et al. (2009)
Processes -Key Results	Martínez-Lorente et al. (2009), Evans (1996), Pannirselvamy Ferguson (2001)

Table 21: Theoretical support for the new proposed relationships. (Gómez JG, Costa MM, Rafael A, Lorente M, 2012)

There are some empirical work supports the existence of interrelationships between the enabler sides of the EFQM Excellence Model (Dijkstra, 1997; Eskildsen, 1998; Eskildsen and Dahlgaard, 2000; Prabhu et al., 2000; Reiner, 2002; Bou-Llusar et al., 2005). As Eskildsen et al. (2000) has shown that the enabler criteria are linked together in a very complex structure, making it very difficult to discern between them. According to this interpretation of the enabler side of the EFQM Excellence Model, changes in one dimension are related to changes in other dimensions, and there is therefore a reciprocal interdependence between all enabler components. (Bou-Llusar, Escrig-Tena, 2008)

Moreover, results on one level contribute to outcomes on others, and interrelationships between the results are expected to exist from a TQM initiative (Oakland and Oakland, 1998; Evans and Jack, 2003).The results set in the EFQM Excellence Model includes this kind of measure, as it collects the measure of both tangible and economic terms, together with less tangible measures, such as customer perspective or employee motivation. In the same vein, as suggested by some authors (Kaplan & Norton, 1992), the hard business results considered in the EFQM Model should be linked to the less tangible attributes. Excellence consists not only of the achievement of key business results but also of satisfying internal and external customers, and the society in which the organization performs its activity (Nabitz et al., 2001).

There are more researchers that proposed empirical evidence in the context of the EFQM Excellence Model and supported significant interrelationships between the result elements (Reiner, 2002; Calvo- Mora et al., 2005).The level of excellence achieved by any organization is therefore reflected in all the result criteria, as they are conceived as manifestations of an underlying factor that represents the result excellence of organizations. This factor encompasses the equilibrium in the satisfaction of the organizational interest group's need and it explains the common variation in the four result indicators. (Bou-Llusar & Escrig-Tena, 2008)

1.2.4. EFQM benefits and pitfalls

The EFQM Excellence Model is a practical tool that can be used in a number of different ways (Urbaniak, 2004; Sochacki, Michalska, 2007). Based on literature review EFQM is a tool for self-assessment; a way to benchmark with other organizations; a guide to identify areas for improvement, the basis for a common vocabulary and a way of thinking and a structure for the organization's management system. (Michalsk, 2008). Santos-Vijande et al in 2007 suggested that the EFQM Excellence Model is a practical tool that offers several advantages from the empirical research perspective, as below:

- ✓ The model is regularly revised and updated, incorporating the contributions of EFQM consultants. Therefore, the set of constructs underlying the model is not limited to a single researcher's view of TQM, which also guarantees its comprehensiveness, dynamism and tracking of the latest developments in TQM.

- ✓ It provides an extensive set of sub-criteria to detail the exact meaning of each criterion.

- ✓ Award models are intended to be instruments for comparing an organization with its competitors in order to achieve and/or maintain competitive advantage. When survey data based on these models is provided to the firms, the self-assessment of TQM implementation and the identification of areas for improvement in relation to the firm's closest competitors is substantially facilitated, which increases the practical implications of the research. (EFQM, 2006).

- ✓ In the case of the EFQM Excellence Model, the increasing convergence of European markets dissipates any concern regarding the universalism issue. Therefore, empirical evidence relative to the effects on performance of TQM practices according to this model acquires great relevance for all firms competing in the European Union.

- ✓ Evaluating the organizations processes and performance against a uniform and predetermined set of strategic priorities not only makes the design process easier, but more importantly for the Business Excellence Model enables the standardized benchmarking of results between different organizations, even if they are active in different markets or industries. Even though the Business Excellence Model design requires compliance with standard design rules, the EFQM makes it clear, that a number of alternative design approaches exist depending on an organizations prior knowledge of

the methodology as well as its commitment to the process and level of resource allocation (EFQM, 1999).

Hilman in 1994, in a study on self-assessment, has elaborated further on the benefits of the EFQM Model, stating (Watson, 2002):

- It is not a standard but allowing interpretation for all aspects of the business and all forms of organization.
- Its widening use facilitates comparison between organizations. This provides the potential to learn from others in specific areas by using a common language.
- The inclusion of tangible results ensures that the focus remains on real improvement, rather than preoccupation with the improvement process, is it focuses on achievement not just activity.
- Training is readily available in the use and scoring for the model.
- It provides a repeatable basis that can be used for comparison over several years.
- The comprehensive nature and results focus, broken down into discrete elements, helps develop a total improvement process specific for each organization; it is a model for successful business. (Hillman, 1994)

In the other hand Langroudi et al. in 2008, explained that EFQM model possesses all the characteristics of the complete model but has some disadvantages: (Langroudi, Jandaghi, Ben Mustafa, 2008)

i. EFQM is an additive model in which the interaction effects of variables and indices cannot be assessed. These interaction effects are known as synergic effects which may be more than the total of individual effects.

ii. There is a tradeoff between the model's criteria that results in covering the weakness of a criterion by the strength of another. Since the purpose of an assessment in this model is the evaluation of the realization of model's concepts, the rate of this trade off must be determined. For example, in the process of getting promotions, the satisfaction of customers cannot be sacrificed.

iii. Since achieving a maximum of 1,000 points in the nine criteria is the purpose of EFQM, no realistic promotion strategy is in the hand of decision maker. In other words, there is often a big gap between the evaluated unit and the standards of the ideal unit so that no useful information toward improvement can be gained from the evaluation.

iv. Because of qualitativeness of criteria and sub criteria, there is a high probability of wrong evaluations.

1.2.5. Necessity of an excellence model specifically for VOs:

The management of organizations in a complex and changing world presents a major challenge. Making sense of conflicting priorities, allocating limited resources, understanding the impact of the organizations actions, comparing performance with competitors and

responding to customer needs are just some of the issues management have to address. Balancing the effort of the organization to address these and the many other issues and challenges faced can be a daunting task. For many organizations there is no time to adopt a systematic approach to the challenge. Some organizations seek solutions that avoid the complexity described above. They search for the solution, the initiative that will provide the answer and magically transform their performance and create success.

According to Quality management section Business Excellence is all about making organizations perform better; produce better profits; achieve success; deliver its aims .A set of principles and tools that can be used to improve any organization, but as is the case with any tool it can also be misused and its value diminished or lost. It's about delivering real bottom line improvements in performance to private and public sector organizations.

Based on literature review of quality management concept, we decided to choose EFQM Model as the latest manifestation of total quality management which is TQM as our main focus. Among all of the quality and Excellence models in the world, EFQM Excellence Model is a widely used organizational framework, with more than 30,000 organizations using it. In recent years, more and more countries started implementing the Model, especially across Middle East, Asia, Africa and South America. This is a valuable framework to take into account relevant aspects for any business and so it can be benchmarked with best in the market. EFQM Model is a great tool to open the mind of the leadership about possibilities of improvement of competitiveness.

Also there are many research indicates that organizations implementing TQM/ BEM will obtain significant benefits including both increased financial profit (Hendricks & Singhal, 1996; Hausner, 1999; Hendricks & Singhal, 2000; Hansson & Eriksson, 2002; Jacob et al., 2004; Boulter et al., 2013) and non-financial outcomes (GAO, 1991; Powell, 1995; Curkovic et al., 2000; Hoisington & Huang, 2000; Douglas & Judge, 2001).

Some of the critics of this model believed in Albert Einstein's quote that "Not everything that can be counted counts & not everything that counts can be counted". But The EFQM Excellence Model is a framework that beside model details with help of Fundamental concepts and RADAR assessment tool gives you a road map for developing any organization. This frame work also could measures your progress to Excellence. This Model's framework and assessment process can be used by any organization regardless of sector, size or industry as a means of identifying strengths and areas for improvement in a holistic way.

Although European foundation for quality management introduced this model as a solution for all the organization regardless of size and industry but technological advancements made huge changes in the structure of organizations and the way the arranged work that it seems necessary or redefine the model in terms of main factors, sub-criteria and scores to get close to the reality of this century. Virtual Organizations are the face of technological change in the work structure but how many of the enterprises that got assessed based on this model was Virtual organizations? According to the difference between Virtual and Traditional Organizations, there must be some difficulty and challenges while implementing EFQM on a

VO! So do Virtual Organization need any specific Excellence model or the current EFQM 2013 would be totally compatible with them?

Clearly, virtual teams are becoming the norm for organizations that require people in multiple locations around the world to work together. We already live with the reality that most teams do some or all of their work in a virtual setting, where teammates housed in another building may be as those across the globe. The new test facing businesses is how to get virtual team members to work well together across geographic, cultural, and organizational boundaries to deliver results quickly, effectively, and consistently.

For example Forming and Leading Virtual Teams is much different from traditional firms so in this model there is great need to focuses on these challenges. Other challenges that need to get specifically addressed are how to create a sense of trust in a dispersed work environment, utilizing technology, dealing with cultural differences, and maintaining a sense of direction and team unity.

In the virtual organization literature review we discussed about Factors Contributing to the growth of virtual teams like advances in technology that increased use of computers in the workplace and greater availability of affordable technology for home-based and mobile workers. Also globalization of business means that team members may not be physically collocated and may even be in different time zones and travel to meet face-to-face may not be practical or affordable.

This factor creates benefits of working as virtual teams. This kind of teams can be assembled based on people's skills rather than their location, and people can work anywhere and at anytime. VTs have increased productivity because the global work day is 24 hours, not 8 hours, and virtual workers spend less time commuting and in inner-office discussions so overhead costs reduced and more flexibility created for workers.

To be successful, argue Goldman et al. (1995), each firm must focus on achieving world class excellence. Virtual Organization as a new form of enterprises must have a roadmap toward this excellence. Having Business Excellence model and benchmarking based on it, provides the path for success in today's and tomorrow's world.

That is Obvious that these organizations have their own characteristics which affect the way they need to change to be more productive. The necessity of having an excellence model for virtual organizations are:

1. The available EFQM model designed for traditional organizations and it does not fit the VOs.
2. A special VO excellence model will have major impact on competitiveness and performance of a VO.
3. VO excellence model is relevant for long-term competitiveness and sustainability, and only minor changes to the design of the frameworks (if any) are needed.

4. VO excellence framework is over-arching frameworks within which other initiatives/quality tools fit
5. Focus on implementing the core concepts of excellence by assess where a VO is on its journey.
6. Virtual Organizations can benchmark and learn from best practices in their market.

EFQM model specifically for VOs could be a "driver" for continuous improvement and sustainable excellence. This model could be a managing perspective and a powerful way to lead long lasting organizations & aimed to bring prosperity for internal people and for communities where they operate. As EFQM itself is a non-prescriptive assessment framework that can be used to gain a holistic overview of any organization regardless of size, sector or maturity this could be a great help for Virtual organization as the new form of organizations. Virtual organization excellence model will acts as an X-ray to diagnose body of the virtual organization and take the preventive and corrective actions accordingly.

To find out if EFQM 2013 is suitable for assessing Virtual organization and if not to develop a new excellence model for Virtual Firms we need to first conduct an extensive Literature review to collect all the possible factors on productivity and excellence of a virtual organization . Next section of this chapter belongs to this step and the evidence of factors in the VO literature.

1.3. Part 3: Extensive Literature Review

1.3.1. Virtual Organization literature extensive literature review based on Excellence concept

An extensive literature review is a set of systematic reviews; a method for systematically analyze the literature from topics point of view. While when we look at the available literature the big picture is something more fuzzy and ambiguous but after extensive literature review we could divide it by sub topics and relate each study to one or more topic. The final results would be more like creating an image of a topic by light points.

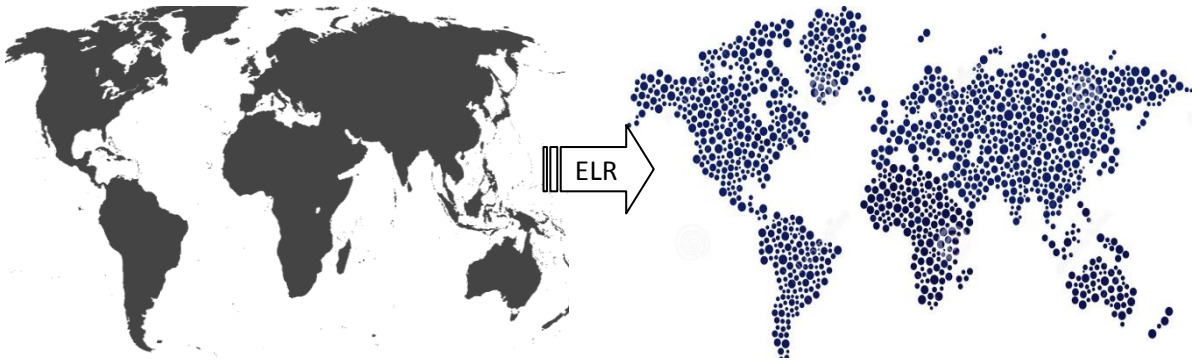


Figure 35 : Extensive literature review (ELR) schematic result

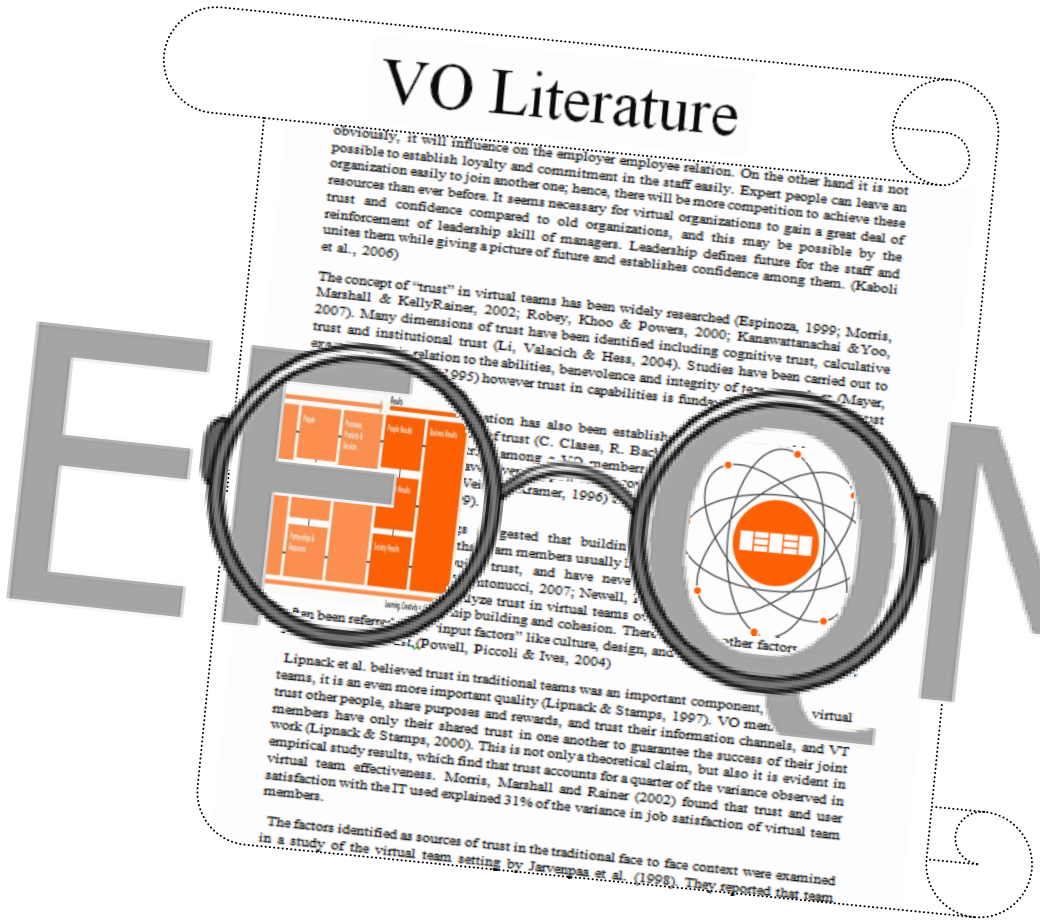
This conclusion is stronger than the analysis of any single study, due to increased numbers of subjects, greater diversity among subjects, or accumulated effects and results.

If the individual studies utilized randomized controlled trials, combining several selected results would be the highest-level of evidence on the evidence hierarchy, followed by systematic reviews, which analyze all available studies on a topic. This method has greater ability to extrapolate to general population affected and considered an evidence-based resource. To overcome the limitation of this kind of methodology we tried to choose studies that were similar in type.

On the other hand, based on what we discussed in quality management section we chose European foundation of quality management (EFQM) model to put it as a base of Extensive Literature Review. EFQM as the last expression of the dominant approach of quality management represents a specific framework and language. In this study we tried to conduct the Extensive Literature Review (ELR) on VO literature review based on this frame work and language. This is going to be a powerful tool to create a same language in the survey of this study. Also Using extensive literature review technique on VO literature helped us to represent the “big picture” of VO effectiveness quickly and efficiently.

To start this research on recognizing factors that has effect on virtual organization’s productivity and excellence we chose Hunter and Schmidt’s (HandS) method (Hunter, 1990) that has been proven as the most popular approach. Based on this method, we started literature analysis and identified the factors which affect the productivity of a virtual organization.

Excellence in a Virtual organization can be translated into efficiency, effectiveness, productivity, success and etc. In the extensive literature analysis we collected 302 factors that were mentioned in Appendix D. To have clearer image we are calling this model "300". Here we will analyze 40 of these statements of the extensive literature review to see the process of their extraction for Literature review as the questionnaire build up of much summarized version of this model.



1.3.2. ICT related statements in Extensive Literature Review

(a) Cloud computing versus organization's own data server. This reduces system errors, natural threats such as hardware damage, supply failure, fire, flood, etc.

Keywords: ICT framework, data server, cloud computing
References in Literature: *Mell (2009); Yates, Orlikowski, Woerner (2003); SUN (2001); Magiera, Pawla (2005).*

(b) ICT framework have been chosen or designed to offer good quality for Virtual working.

Keywords: ICT framework, virtual working, task technology fit ICT framework
References in Literature: *Ale Ebrahim, Ahmed, Abdul Rashid, Taha (2011); Ale Ebrahim, Ahmed , Taha (2009); Duarte, tenant-Snyder (1999); Zigurs (2003); Mortensen, Caya & Pinsonneault (2009); Staples, Webster (2007); Lu, Watson-Manheim, Chudoba,Wynn(2006);*

Qureshi , Vogel(2001) ; Ocker, Fjermestad(2008); Joinson (2002); Bell, Kozlowski(2002); Strader et al.(1998).

(c) Physical location of the colleagues is not important using ICT framework to send short notes and documents.
Keywords: ICT framework, physical location, sending messages

Reference in Literature: *Yates, Orlikowski, Woerner (2003); Ale Ebrahim N, Ahmed S, Abdul Rashid SH, Taha Z (2011); Gould (1997); Rezgui (2007);* Davenport, Pearlson (1998).

(d) VO's ICT Framework provides remote access to resources and Control for members.

Keywords: ICT framework, remote access
Reference in Literature: *Thissen, et al., (2007); Scott, Snell (1998); Ale Ebrahim, Ahmed, Taha (2009); SUN (2001); Ale Ebrahim, Ahmed, Abdul Rashid, Taha (2011).*

(e) Possibility of video conferencing between geographical despaired members.

Keywords: video conferencing, ICT framework
Reference in Literature: *Townsend, DeMarie, Hendrickson (1998); Ale Ebrahim, Ahmed, Abdul Rashid, Taha (2011); Ale Ebrahim et al. (2009); Erastos Filos (2006); Shirley Gregor, Arjen Wassenaar, Stewart Marshall (2002); Stohr et al. (2000); Lin, Standing, Liu (2008); Gould (1997); Stough, Stanley ,Eom, Sean, Buckenmyer, James (2000); May ,Carter (2001); Bergiel, Bergiel, Balsmeier (2008); Mohammad K (2009).*

1.3.3. Communication related statements in Extensive Literature Review

(a) Form fast and effective communication: using email and collaborative software systems make formal presentations; send email vs. voicemail messages…

Keywords: communication medium, channels
Reference in Literature: *Pawar ,Sharifi(1997); Maznevski, Choduba (2000); Sole, Edmondso(2002); Pauleen, Yoong (2001); Alexander (2000); Kezsbom (2000); Lipnack ,Stamps (2000); Solomon (2001); Ahuja, Carley (1998); Kiesler , Fong Boh ,Ren ,Weisband(2008); Berry (2011); Harvey, Novicevic, Garrison (2004); Shachaf, Hara (2005); Durai (2012); Anderson, McEwan, BalJ, Carletta (2007); May, Carter, Joyner(2000).*

(b) Using code of conducts (request for information within 24 or 48 hours) in communication to avoid delays.

Keywords: Communication content, delay in response
Reference in Literature: *Cooney (2004); Huffaker, Tversky ,Ferriman (2006); Sarker, Grewel , Sarker (2002); Thissen et al. (2007) ; Ahuja, Carley (1998); Seung Heon Han, Kyung Ho Chin and Myung Jin Chae (2007); Schlenkrich, Upfold (2009); Gould (1997); Talukder, Yeow (2006); Das gupta (2011); Anderson, McEwan, BalJ, Carletta (2007); Kabasakal, Asugman, Develioğlu (2006); Koch (2002); Ale Ebrahim, Ahmed, Abdul Rashid, Taha (2010); Den Hartog, Keegan, Verburgb (2007).*

1.3.4. Culture related statement in Extensive Literature Review

(a) VO's culture designed in the way that personal barriers does not make any trouble, culture is a mix of Gender, Age, Discipline, Identity, Ethnic background, Native language, Preverbal, Theoretical framework.

Keywords: Culture, VO's cultural barriers
Reference in Literature: *Staples , Zhao (2006); Pawar, Sharifi (1997); Erickson (2000); Hofstede (1991); Ogbor (2000); Kramer (2005); Jackson, Gharavi , Klobas (2006); Depickere (1999); Powell, Piccoli, Ives (2004); Shea, Guzzo (1987); Sundstrom at el, (1990); Schein (1992); Hofstede (1991); Furst, Blackburn , Rosen (1999); Espinosa et al. (2003).*

1.3.5. Customer related statement in Extensive Literature Review

(a) The project or suggested product should be well described by customers.

Keywords: Virtual customer, virtual stakeholders
Reference in Literature: *shekhar (2006); Venkatraman, Henderson (1998); Byrne (1993) ; Gilmore, Pine (1997) ; Davidow ,Malone (1995); Etcher (1997); Crandall ,Wallace (1998); Jackson (1999); Cordery et al. (2009); Davenport, Pearlson (1998) ; Cooper, Rousseau (1999); Tien Van Do (2010) ; Chesbrough, Teece (2002); Koch (2002); Cueni, Marco Seiz (1999); Introna , Cushman, Moore (2002).*

1.3.6. Environment (market) related statement in Extensive Literature Review

(a) VO is committed to be influenced by environment, stakeholders and customer's opinion.

Keywords: Environment, customer, stakeholders, suppliers,
Reference in Literature: *Das gupta (2011); Jackson, Gharavi, Klobas (2006) ; shekhar (2006); Daft, Richard (1998); Introna , Cushman, Moore (2002); Kirkman, Bradley, Gibson, Cristina (2004); Brunelle, Eric (2009); Godar, Pixy Ferris (2004); Harvey, Novicevic, Garrison (2004); Siqueira Ferreira ,Pinheiro de Lima, Gouvea da Costa (2012), Roberts ,Svirskas, Matthews (2005).*

1.3.7. Innovation related statement in Extensive Literature Review

(a) Using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders

Keywords: Innovation, generate value.
Reference in Literature: *Venkatraman N, Henderson J (1998); Larsen, McInerney (2002); Miles, Snow , Miles (2000); Zhouying (2005); Chesbrough HW, Teece DJ (2002); Introna, Cushman, Moore (2002); Barbini FM, D'Atri A (2005); Ale Ebrahim, Ahmed, Abdul Rashid, Taha (2009); Stough S, Eom S, Buckenmyer J (2000); Abuelmaatti A, Rezgui Y (2008); Brunelle E (2009).*

1.3.8. Knowledge related statements in Extensive Literature Review

(a) Documentation of all the knowledge shared and communications in the electronic archive.

Keywords: Knowledge documentation, Knowledge sharing.
Reference in Literature: *Malhotra (2000); shekhar (2006); Rosen, Furst, Blackburn (2007); Durai (2002); Staples ,Webster (2008); Venkatraman, Henderson (1998); Kaboli A, Tabari M, Kaboli E (2006); Cooney (2004); Ebrahim, Ahmed, Taha (2009); Tong ,Yang (2013); Rosen, Furst ,Blackburn (2007); Zakaria, Amelinckx ,Wilemon (2004); Martins, Gilson, Maynard (2004); WI et al.(2008).*

(b) Knowledge is the information that has a purpose or use is organizational and individual's improvement and group's contributions create a richer construction of that information.

Keywords: VO Knowledge, knowledge purpose, Improvement
Reference in Literature: *Das gupta (2011); Oertig, Buergi (2006); Shamir (1999); Den Hartog (2004); Davenport (2005); McKinlay (2005); Cordery et al. (2009) ; Hanson (2007) ; Shachaf, Hara (2005); Quintas et al (1997); Gupta et al (2000); Denison , Mishra (1995) ; Malhotra (1997); Lin FR, Lin SC, Tzu-ping H (2008); Vinaja R (2003); Sole D , Edmondson A (2002); Rae L (1998); Griffith TL , Neale MA (2001).*

1.3.9. Leadership related statements in Extensive Literature Review

(a) Leader is assertive yet not too bossy, caring, relates to members at their own levels, and maintains a consistent attitude over the life of the project

Keywords: V leadership, personal characteristic, attitude
Reference in Literature: *Durai (2002); Lurey and Raisinghani (2001); Das gupta (2011); Lipnack & Stamps (1997); O'Hara-Devereaux ,Johanson (1994); Kramer (2005); Shachaf (2005); Oertig, Buergi (2006); Duarte , Snyder (1995); Oakley (1998); Switzer (2000).*

(b) Leader needs to consider the nature of task for choosing the appropriate technology

Keywords: V leadership, task- technology fit
Reference in Literature: *Miles, Snow , Miles (2000); Redoli, et al. (2008); Avolio, Kahai, Dodge (2000); Zigurs (2003); Watson-Manheim, Chudoba, Crowston (2002); Jarvenpaa, Leidner (1999); Massey, Hung, Montoya-Weiss, Ramesh (2001); Jarvenpaa, Leidner (1999); Chidambaram, Kautz (1993); Anderson (2000); Becker, Steele (1995); Davenport & Pearlson (1998); Durmusoglu ,Calantone (2006); Ozer M (2004); Taifi (2007); Zhouying (2005); Nadler , Gerstein (1992); Ale Ebrahim, Ahmed, Taha (2009) ; Strader et al. (1998).*

(c) Leader provides continuous feedback, engages in regular and prompt communication

Keywords: V leadership, Relation with team
Reference in Literature: *Tong, Yang (2013); Lurey, Raisinghani (2001); Yu Tong et al. (2013); Duarte, Tennant-Snyder (1999); kayworth, leidner (2001); Pauleen (2003); Kramer (2005); Kelly, Davis, Nelson, Mendoza (2008); Misiolek, Heckman (2005); Cassell, Huffaker, Tversky, Ferriman (2006); Sarker, Grewel, Sarker (2002); Oertig, Buergi (2006); Duarte, Snyder (1995); Hara, Bonk, Angeli (2000); Kayworth, Leidner's study (2001) ; Jarvenpaa, shaw (1998); Kitchen, McDougall (1999); Lipnack, Stamps (2000); Robey et al. (2000); Cordery at al. (2009); Hron et al. (2000); Warkentin et al. (1999); Hunsaker and Hunsaker (2008); Meyerson et al,(1996); Walvoord et al. (2008).*

(d) Leaders determine of a rough structure of the potential VO, looking the required competencies and capacities, organizational form and corresponding roles .

Keywords: V leadership, VO structure design
Reference in Literature: *Lurey, Raisinghani (2001); Kramer (2005); Shachaf (2005); Oertig, Buerg, (2006); McKinlay (2005); Crandall, Wallace (1998); Jackson (1999); Jackson, Gharavi, Klobas (2006); Depickere (1999); Cordery at al. (2009); Hunsaker, Hunsaker (2008); Davenport, Parson (1998); Majchrzak et al. (2000 b); Johnson, Suriya, Won Yoon, Barrett, La Fluer (2002); Jarvenpaa, Leidner (1999); Daily, Whatley, Ash, Steiner (1996); Dennis & Valacich (1993); Ngwenyama, Lyytinen (1997); Strader et al. (1998).*

(e) Leaders set high performance expectations like behaviors like working across boundaries and using technology effectively.

Keywords: V leadership, Performance milestone
Reference in Literature: *Lurey, Raisinghani (2001); Oertig, Buergi (2006) ; Kayworth, Leidner (2001); Thompson (1989); Adami (1999); Depickere (1999); Cordery at al. (2009); Bell, Kozlowski (2002); Lee (2002).*

(f) Leadership should have a good strategy in Team selection

Keywords: V leadership, team selection
Reference in Literature: Lepnak D, Snell SA (1998) ; *Lurey, Raisinghani (2001); Yu Tong et al. (2013); Shachaf (2005); Saleem, Krznari, Newhouse, Darlington (2003); Oertig, Buergi (2006); Depickere (1999) ;Cordery at al. (2009); Bell and Kozlowski (2002); Grabowski M, Ayyalasomayajula P, Merrick J, Harrald JR, Roberts K (2007); Godar SH, Pixy Ferris S (2004).*

(g) Leader must develop a shared understanding and commitment to the team's purpose, roles and responsibilities of members

Keywords: V leadership, Role clarity, shared purpose, project and team management
Reference in Literature: *Pawar, Sharifi (1997); Tong, Yang (2013); Duarte ,Snyder (1995); Ale Ebrahim, et al. (2011); Lurey, Raisinghani (2001); Hertel, Geister, Konradt (2005); Yu Tong et al. (2013); Kramer (2005); Shachaf (2005); Oertig, Buergi (2006); Duarte, Snyder (1995); Shamir (1999); Den Hartog (2004); Shamir (1999); Barker (1993); Bradford, Cohen*

(1987); Huey (1994); Ghiselin (1994); Thompson (1989); Adami (1999); Davenport (2005); Drucker (1999); Jarvenpaa ,shaw (1998); Kitchen, McDougall (1999); Lipnack, Stamps (2000); Robey et al. (2000); Warkentin et al. (1999); Majchrzak et al. (2000b); Johnson, Suriya, Won Yoon, Barrett ,La Fluer (2002).

1.3.10. Partners related statements in Extensive Literature Review

(a) In partner management, lack of common collaboration infrastructure and preparedness of organizations to join the collaborative process is dangerous

Keywords: Partnership, provider, Common infrastructure, partnership characteristic
Reference in Literature: *Durai P (2012); Larsen, McInerney (2002); Weber (2002); Pawar, Sharifi (1997); shekhar (2006); Powel (1990); WI et al. (2008); Oracle Corporation (2004); Strader et al. (1998); Camarinha, Afsarmanesh (2007); Goranson (1999); Fornasiero , Zingiaconi (2004); Daft, Richard (1998); Cooper, Rousseau (1999); Putnik GD, Cruz-Cunha MM (2008); Chesbrough, Teece (1996); Folinas D, Manthou V, Sigala M, Clachopoulou M (2004); Ganzha M. et al. (2012).*

(b) The company is prepared to form alliances with partners and collaborator in the market in an attempt to achieve competitive advantage.

Keywords: Partner alliance, competitive advantage, collaboration with partners
Reference in Literature: *Travica (2005); Shekhar (2006); Strader et al. (1998); Martinez, Fouletier, Park, Favrel (2001); Camarinha, Afsarmanesh (2007); Nishioka, Kasai, Kamio (2003); Busschbach, Pieterse, Zwegers (2002); Nishioka et al. (2003); Putnik GD ,Cruz-Cunha MM (2008); Cooper, Rousseau (1999); Siqueira Ferreira PG, de Lima EP, Gouvea da Costa SE (2012) ; Khalil O , Wang S (2002); Caldas, Wood (1999); Rodrigues EF, Tavares Dalcol PR, Domingues Pizzolato R, Maruyama U (2013).*

1.3.11. Policy related statement in Extensive Literature Review

(a) VO's Policy and strategy is based on information from performance measurement, research, learning and external related activities and benchmarking and analysis market and customers

Keywords: Virtual policy, benchmarking
Reference in Literature: *Nagaratnam et al, (2002); Griffith et al. (2003); Rezgui (2007); Chen R, Hsu C, Chang C, Yeh S (2005); Kerschbaum F, Robinson P (2008); Cueni T, Seiz M (1999); Hughes JA, O'Brien J, Randall D,Rouncefield M, Tolmie P (1998); Hartoga D, Keegana A, Verburgb RM (2007).*

1.3.12. Process related statements in Extensive Literature Review

(a) Process makes the knowledge visible to everyone; there are Processes to manage the knowledge that is in the VO and develop it.

Keywords: Process design, knowledge sharing process, process development
Reference in Literature: *Bal , Gundry (1999); Rosen, Furst, Blackburn (2007); Sarker et al. (2001); Suchan, Hayzak (2001); Shekhar (2006); Travica (2005); Venkatraman N, Henderson J (1998); Kaboli et al. (2006), Kraut et al. (1998); Upton, McAfee (1996); Venkatraman, Henderson (1998); May ,Carter (2001); Martinez, Fouletier, park (2001); Park, Hwang (2003); Duarte , Snyder (1995); Lurey, Raisinghani (2001); Chudoba, et al. (2005); Gould D. (1997); Gibson, Cohen's (2006); Hackman, Oldham (1980); ; Kirkman, et al. (2002); Tong, Yang (2013); Oertig M, Buergi T (2006); Sawyer, Guinan (1998); Janz, Wetherbe, Davis, Noe (1997); Zaccaro, Bader (2003); Saleem, Krznari, Newhouse, Darlington (2003); Magiera, Pawlak (2005); Strader et al. (1998) ; Camarinha, Afsarmanesh (2007); Goranson (1999); Gupta et al (2000); Gaudes A. et al. (2007).*

(b) Process improvement: having a cycle time to improve, based on the time required to order and install custom new process

Keywords: process improvement, new process innovation
Reference in Literature: *Duarte, Snyder (1995) ; Raisinghani (2001); Shachaf, Hara (2005); Duarte, Tennant-Snyder (1999); Oertig, Buergi (2006); Duarte, Snyder (1995); Adami (1999); Jackson, Gharavi, Klobas (2006); Jackson (1999); Daily, Whatley, Ash, Steiner (1996).*

1.3.13. Productivity related statements in Extensive Literature Review

(a) VO productivity is lower costs, access to a greater pool of talent, more customer intelligence and higher productivity:

Keywords: internal performance, People performance
Reference in Literature: *McDonough, Kahn ,Barczak (2001); Mulebeke, Zheng (2006); Gaudes et al. (2007); Ortiz de Guinea ,Webster (2005); Gibson, Cohen (2006) ; Hofstede (1991); Hron et al. (2000); Jarvenpaa et al. (l998); Lipnack, Stamps (2000); Warkentin et al. (1999); Kirkman, Rosen, Gibson, Tesluk, McPherson (2002); Hunter (1990); He R (2008); Larsen, McInerney (2002) ; Abuelmaatti, Rezgui (2008); Khalil ,Shouhong (2002).*

(b) VT performance measures: number of items produced, accuracy of financial contracts, development of new business, and customer retention as objective, quantifiable measures of evaluating individual performance on virtual teams

Keywords: external performance, financial performance, customer productivity
Reference in Literature: *Lipnack, Stamps (1997); Venkatram, Henderson (1998) ; Daft, Richard (1998); Tamošiūnaitė R (2011); Camarinha, Afsarmanesh (2006); Jacobsen K (2004); Winton LJ (2005).*

1.3.14. Security related statements in Extensive Literature Review

(a) High level security in ICT frame work for VOs data ,information and knowledge

Keywords: ICT framework security, machine side of security
Reference in Literature: *Kerschbaum F, Robinson P (2008) ; Voster (2003); NIST (1998); Magiera, Pawlak (2005); Gui, Xie, Li, Qian (2004); Golbeck, Hendler (2004); Lee (2005);*

Niinimaki, et al. (2004) ; Cao et al. (2006) ; Bal, Teo (2001); Nagaratnam et al (2002); Lockhart (2004); Peikari, Chuvakin (2004); Burnett (2004) ; McNab (2004); Grimes (2001) ; Magiera, Pawlak (2005); Juric et al. (2006); Kerschbaum , Robinson (2008); Magiera J, Pawlak A (2005).

(b) The safety level of Virtual Organization is depended on each members their communication security level

Keywords: ICT framework security, Human side of security
Reference in Literature: *Nagaratnam et al. (2002); Magiera, Pawlak (2005); Magiera J, Pawlak A (2005); Yates, Orlikowski (2003); Magiera, Pawlak (2005); Cao et al. (2006); Kerschbaum, Robinson (2008).*

1.3.15. Suppliers related statement in Extensive Literature Review

(a) Data and Knowledge provided by suppliers and customers are available in the IT framework

Keywords: VO Supplier, Virtual partner, knowledge exchange with partners
Reference in Literature: *He R (2008); shekhar (2006); Byrne (1993); Roberts B, Svirskas A, Matthews B (2005); Davidow, Malone (1995); Zaccaro, Bader (2003); Das gupta (2011); Etcher (1997); Palmer JW, Speier CA (1997). Langevin P (2008); Durai P (2012); Fitzpatrick WM, Burke DR (2000); Martinez MT, Fouletier P, Park KH, Favrel J (2001); Ale Ebrahim N, Ahmed S, Abdul Rashid SH, Taha Z (2010); Ale Ebrahim N, Ahmed S, Abdul Rashid SH, Taha Z (2012).*

1.3.16. Teams related statements in Extensive Literature Review

(a) Identifying and using the Cultural differences between employees as an opportunity.

Keywords: Culture, Virtual teams
Reference in Literature: *Martinez-Sanchez et al. (2006); Kankanhalli, Tan , Wei (2006) ; Poehler, Schumacher (2007); Paul et al (2005); Chudoba, et al. (2005); Staples, Zhao (2006); Pawar, Sharifi (1997) ; Erickson (2000); Suomi, Pekkola (1999); Ogbor (2000) ; Kramer (2005); Jackson, Gharavi , Klobas (2006); Zhouying (2005); Powell, Piccoli & Ives (2004); Furst, Blackburn, Rosen (1999).*

(b) Perception of cohesion (team belonging and feelings of morale) should be in VT members

Keywords: Cohesion, integrity, VT membership, team formation & structure
Reference in Literature: *Cascio (2000); Kratzer, Leenders (2005); Gaudes, et al. (2007) ;Ale Ebrahim, Ahmed, Taha (2009); Leenders, Engelen, Kratzer (2003); Powell, Piccoli, Ives (2004); Gajendran, Harrison (2007); May, Carter (2001); Bal , Teo (2001); Gassmann ,Von Zedtwitz (2003); Shin (2005); Hertel, Geister, Konradt (2005); Rezgui (2007); Bal , Teo (2001); Paul et al. (2005); Wong ,Burton (2000); Cascio ,Shurygailo (2003); Leenders, Engelen, Kratzer (2003);*

Hunsaker ,Hunsaker (2008); Martinez, Fouletier, park (2001); Tong, Yang (2013) ; Joinson (2002); Massey, Montoya-Weiss, Song (2001).

(c) Relationship building is so important in a VT and can strengthen feelings of inclusiveness or a sense of belonging

Keywords: Communication, relationship building
Reference in Literature: *Gassmann, Von Zedtwitz (2003); Hertel, Geister, Konradt (2005); Cascio, Shurygailo (2003); Peters, Manz (2007); Vakola, Wilson (2004); Lee-Kelley, Sankey (2008); Wong, Burton (2000); Dafoulas, Macaulay (2002); Peters, Manz (2007); Gassmann, Von Zedtwitz (2003); Rezgui (2007); Precup et al. (2006); Bordia (1997); Lipnack, Stamps (2000) ; Massey, Montoya-Weiss , Hung (2002); Lu, Watson-Manheim, Chudoba, Wynn (2006); Park, Hwang (2003); Cascio, Shurygailo (2003); Cummings (2004) ; Hossain, Wigand (2004); Gibson , Cohen (2006).*

(d) The development of a fair and motivating reward system is important issue in a VT

Keywords: reward system, Virtual teams
Reference in Literature: *Hambrick, Davison, Snell , Snow (1998) ; Ryssen , Godar (2000); Hertel, Geister , Konradt (2005); Bal, Teo (2001); Lurey , Raisinghani (2001); Bal J , Gundry J (1999).*

(e) VT Employee should be : technical knowledgeable, social adequacies , adaptable ,plan-ahead, well organized, flexible, low levels of neuroticism ,resilient, extroverted, self-confident ,open to new experiences , highly self-motivated ,Establishing goals, developing plans to meet those ,goals, and executing plans, Multi-tasking ,influential ,strong sense of urgency and drive

Keywords: Team knowledge, Virtual team member's personal skills
Reference in Literature: *Bal , Teo (2001) ;Kirkman et al. (2004) ; Eppinger, Chitkara (2006); Martins, Gilson ,Maynard (2004); Rice et al. (2007); Johnson, Heimann, O'Neill (2001); Joinson (2002); Gould D (1997).*

1.3.17. Training related statements in Extensive Literature Review

(a) Managers believes and implemented trainings that give members ability to assimilating better ways of doing their jobs also Training can balance Technical and Interpersonal Skills among VT Members

Keywords: Training, Skill based training, empowerment
Reference in Literature: *Ryssen, Godar (2000); Bal, Gundry (1999); Ale Ebrahim, Ahmed, Taha (2009); Joinson (2002) ; Bal, Teo (2001); Jackson, Gharavi, Klobas (2006); Ale Ebrahim, et al. (2011); Oertig, Buergi (2006); Davenport, Parson (1998); Magiera, Pawlak (2005); Fuller, Hardin, Davison (2006); Hertel, Geister, Konradt (2005); Hackman, Oldham (1980); Pearce, Ravlin (1987); Sundstrom et al. (1990); Sundstrom et al. (1990); Montoya-Weiss, Massey, Song*

(2001); Pauleen, Yoong (2001); Warkentin, Beranek (1999); Barker's (1968) ; Surinder, Sosik, Avolio (1997); Warkentin, Beranek (1999); Kaiser et al. (2000); Tan et al. (2000); Van Ryssen, Hayes Godar (2000).

1.3.18. Trust related statements in Extensive Literature Review

(a) Trust in a VO is : Internalization of organizational norms and practices ,Desire to remain with the organization ,Willingness to cooperate with others ,Willingness to share knowledge

Keywords: Internalize organizational norms, Desire to remain in company, willing to cooperate, Willingness to share knowledge
Reference in Literature: *Chen TY, Chen YM, Chu HC (2008); Handy (1995); Hackman, Oldham (1980); Jarvenpaa, Shaw (1998); Ale Ebrahim, et al. (2011). Kankanhalli, Costa (2003); Erdem, Ozen (2003); Tan, Wei (2006) ; Poehler, Schumacher (2007); Paul, et al (2005); Gould D (1997); Ale Ebrahim, Ahmed, Taha (2009); WI et al. (2008); Politis (2003); Chou YM, Collins N (2012) ; Cao et al. (2006); Webster J , Wong W.K.P. (2008) ; Mun J, Shin M , Jung M (2011); Rico R, Alcover CM, Sánchez-Manzanares M, Gi F (2009); Yasir M, Abdullah MT, Majid M (2010).*

1.4. Chapter 1 summary:

In order to provide a good definition of Virtuality and Virtual organizations in this chapter we analyzed the concept of virtuality, definitions of Virtual Organization, History of VOs, characteristics of a VO and discussed about how this form of organization can maximize flexibility and adaptability to environmental changes. We saw that VOs can be a help for development of competencies and better use of resources. Analyzing different aspect of this new structure showed us how a firm can be flexible in critical size to be in accordance with market constraints.

We also analyzed the differences between traditional organization and virtual organization and discussed some of the most famous virtual organization models. For example while in traditional organization membership tenure is normally stable in virtual firms this is dynamic in nature. Also Traditional organization maintain a vertical hierarchy and follow an imposed discipline system to achieve goals while virtual organizations Keep a flatter hierarchy and insist on voluntary commitment

In this chapter we also explored the relatively new leadership paradigm of V-leadership that has arisen in little more than a decade. What are the common challenges between V-leaders and the traditional forms of leadership, and what are the differences. Then we discussed about human resource of this kind of forms as we called "Teams" and what are the most important skills required by this new generation of workforce.

In this part we analyzed the concept of virtual teams and their comparison versus traditional and conventional teams. Then we analyzed different types of virtual teams, Benefits and pitfalls of virtual teams, Effective Virtual Team and life dynamics of Virtual teams. Foe example while in traditional organization there is the opportunity for allocation and sharing of resources in virtual teams each collaborating body will have to have access to similar technical and non- technical infrastructure

In this section we also zoomed in one of the most important aspects of VO's which is communication. The fact that made it important is because team members are not in the same place to have a face to face relations so all the aspects of communication like the content , the media and the culture would play an important role. We also discussed about Information and communication Technology framework as of the most important and distinguishing component of a VO. We saw characteristic of an appropriate Technology which is Secure and fit and how this needs to be done.

We saw that although much has been published regarding this form of organization, but there is a serious lack of empirical studies regarding this new form of organization and concrete theoretical foundation has not yet been developed. And the end we proposed a global VO model which could be applicable to any kind of Virtual Organization that captures all the most important aspects of previous models.

In the second part of this chapter we discussed about the quality management theory and different demonstration of it in face of models. These models refer to an integrated approach to organizational performance management that result delivery of ever-improving value to customers, investors and stakeholders, contributing to organizational sustainability and Improvement of overall organizational effectiveness and capabilities.

To have a thorough understanding of EFQM Excellence model as the latest and most accepted model of TQM we analyzed the different aspect of this framework. We also discussed about main factors of this model, various aspects, interrelation between all the elements.

Last part of this chapter we conduct the Extensive Literature Review on VO literature review based on this frame work and language. The result of this review would be a powerful tool to create a same language in the survey of this study. Also Using extensive literature review technique on VO literature helped us to represent the "big picture" of VO effectiveness quickly and efficiently.

The objective of this chapter was to offer a clear and well defined foundation for the current study in with we could plan and conduct a deep empirical research. In the next part we will discuss about Epistemology, Methodology and Data collection process of this study.

2. Chapter two: Methodology and Data collection process

2.1. Part 1 : Epistemology and Methodology

2.1.1. Definition of epistemology

Epistemology or theory of knowledge is the branch of philosophy that discussed about the nature and scope of knowledge. This field of philosophy tries to find out what can actually be called 'knowledge', how we can acquire knowledge, what do we know about things in the world, what does it mean when we say 'we know this', and how do we know what we know?(Kuhn, 1980).

Eriksson and Kovalainen (2008) define the realm of epistemology as 'what knowledge is and what are the sources and limits of knowledge'. Hatch and Cunliffe (2006) summarize epistemology as 'knowing how you can know' and expand this by asking how is knowledge generated, what criteria discriminate good knowledge from bad knowledge, and how should reality be represented or described (Flowers, 2009).

The primary debate in epistemology circles around the analysis of the nature of knowledge and how it relates to concepts such as truth, belief, justice, and facts. (Lakatos, 1978, Kuhn, 1980). Also, some scholars tried to focus on topics such as the ways that knowledge can be produced, as well as skepticism about different knowledge claims (Popper, 1959, 1979; Kuhn, 1980).Social epistemology is a branch of epistemology that tries to approach the study of knowledge in human societies; it considers human knowledge as a collective achievement (Hatch and Cunliffe, 2006). Hatch and Cunliffe (2006) emphasize on the fact that different paradigms leads researchers to study the same phenomena in different ways. They describe a number of social and organizational phenomena from different perspectives, and highlight how different epistemological perspectives can lead to different kinds of knowledge from the same phenomena.

In other words, it is the study of the social dimensions of knowledge. The principle question in this regard, would obviously be the definition of knowledge in this context. Arriving at a definition of 'social' which can satisfy academics from different disciplines is also a challenge. It also gets to the more practical issues such as the essence of law, evidence, voting, and media. Social epistemologists may be found working in many of the disciplines of the humanities and social sciences, most commonly in philosophy and sociology (Goldman, 1986). Blaikie (1993) argues that each of these issues are highly related to social science since the humanistic element introduces a component of 'free will' that adds a complexity beyond that seen in the natural sciences and others, Emergence of social epistemology is for the most part a result of the works of Karl Popper, Thomas Kuhn and Michel Foucault, which gained much attention at the end of the 1960s. These authors emphasized on problems long associated with the philosophy of science with a historical approach. Perhaps the most notable issue here was the nature of truth, which both Kuhn and Foucault described as a relative and contingent notion.

Of course, social epistemology is a division of formal academic sociology, established by Emile Durkheim (1858–1917) in late 19th century. Durkheim, Marx and Weber are typically cited as the three principal architects of social science, who associated the emergence of modern societies to different factors; capitalism (by Marx and Engels), industrialization and division of labor (by Durkheim), and the emergence of a distinctive way of thinking, i.e. the rational calculation (by Weber) (Harris J, 2001).

2.1.2. Organizational epistemology

One of the sub-branches of social epistemology is the study of organizational behavior, i.e. organizational epistemology. The main focus of this field of philosophy is the systematic study and careful application of knowledge about how people act within organizations, either as individuals or as groups (Hatch and Cunliffe, 2006).

In this essence, organizations have been introduced as communities of knowledge, with their own ways and strategies to turn implicit knowledge into explicit knowledge, and then use, change or discard that explicit knowledge (Moldoveanu, 1999). 'Organizational learning' is one of the main topics in this regards, and has been investigated by different sociologists for the past few decades. As Levitt and March (1988) point out in a review of the literature on organizational learning, learning in organizations has evolved in directions that are quite different from those that have been proposed for collective choice in organizations, decision making and resource allocation processes, and theories of organizational evolution.

Until the mid 1990s, there were not many studies into the nature of the processes of organizational learning and organizational knowledge creation, verification, rejection, or update. Also there were few studies on the nature of the beliefs that people in organizations collectively held. For example, even though the phenomena of cognitive and behavioral conservatism in organizations have been explored (Argyris, 1990), it was not connected to the literature on organizational change, or to the literature on the philosophy and sociology of science ignited by the work of Karl Popper and Thomas Kuhn in the 1960's (Moldoveanu, 1999; Lakatos and Musgrave, 1974).

However, since the mid 1990s, there has been a shift in attention in organizational sciences towards organizational behavior and learning, focusing more of aspects such as belief systems, knowledge, validity and legitimacy in organizational contexts (Nonaka, 1994; Spender and Grant, 1996; Tsoukas, 1996), the dynamics and diffusion of knowledge within industries (Bierly and Chakrabarty, 1996), organizational learning from their own experiences and the experiences of their competitors (Ingram and Baum, 1997), transfer of best practices between organizations (Szulansky, 1996) and the intra-organizational processes by which firms negotiate and operate in the marketplace (Drucker, 1994; Noda, 1995).

Different viewpoints, methods and levels of analysis can be used to study organizational behavior. A traditional classification, usually seen in American literature, is between the study of "micro" organizational behavior -which refers to individual and group dynamics in

an organizational setting- and "macro" organizational behavior which studies organizations as a whole; how and with what strategies and structures they adapt to peripheral changes.

There are so many competing theories for studying organizational life that a framework is required to feasibly understand, analyze and criticize them. The next step would be choosing and applying the most appropriate theory to the research in hand. According to Popper (1959), as a positivist, the best theory is one that has survived the most severe attempts of and was thus able to prove its efficiency in explaining events and to overcome the rival theories. However, Le Moigne (1993) as a constructivist claims that there is no theory available at this time that can be considered the best and most comprehensive of all in the field of organizational studies. (We will see definition of the positivist and constructivist paradigms in the following parts).

The problem in selecting the most appropriate methodology for this research can be reviewed in different perspectives. First trying to examine the main problems and debates in scientific methodology in general; then focus to the more specific domain of social and organizational studies. In this case first we tried to closely study and understand the problem that we want to solve which is to develop an excellence model specifically for Virtual organization. In the next sections we are trying to come up with the more specific domain of study for virtual organizations.

2.1.3. Dilemmas of scientific research: Scientific honesty

For centuries, science meant knowledge that was proven either by the senses or the power of intellect. The dominance and glory of Newtonian physics for centuries didn't leave much room for skeptics to question this perspective of science. Justificationism, which is the identification of knowledge with proven knowledge, was the dominant tradition in rational thought. For justificationists, scientific honesty demanded that one assert nothing that is unproven (Lakatos, 1974; Musgrave 1969 a, 1969 b).

However, when the principles of Einstein's physics overruled the Newtonian mechanics almost everything changed. In Popper's view, intellectual honesty does not mean establishing one's position by 'proving' it; intellectual honesty is specifying precisely the conditions under which one is willing to give up one's position.

This brings up the notion of falsificationism. The basis of falsificationism is that science cannot prove any theory but it can disprove it. This stance implies that there is an absolutely firm empirical basis of facts which can be used to disprove theories. Scientific honesty then consists of specifying, in advance, an experiment such that if the result contradicts the theory, the theory has to be given up. The falsificationists demand that once a proposition is disproved, it must be unconditionally rejected.

Popper and Kuhn both believe that commitment to one belief is unacceptable. However, while according to Popper science is 'revolution in permanence' and criticism is the heart of the scientific enterprise, Kuhn believes that revolution is exceptional and 'extra-scientific'-

and criticism is a deviation (Lakatos & Musgrave, 1974). For Popper scientific change is rational and falls in the realm of 'logic of discovery'. For Kuhn scientific change is a mystical conversion which cannot be governed by rules of reason and falls in the realm of 'psychology of discovery'. For Kuhn, scientific change is a kind of religious change.

This controversy is then complicated by the demarcation problem. Only those theories are considered 'scientific' that forbid certain observable states of affairs and therefore are factually disprovable. In other words, a theory is scientific if it has an empirical basis. The empirical basis of a theory is the set of its potential falsifiers: the set of those observational propositions which may disprove it. The other major dilemma in scientific research is the induction problem: whether it is scientifically acceptable to generalize a particular observation and draw valid universal statements, or any particular observation is only good for formulating a singular factual statement (Popper, 1979). Popper believes that facts can no longer be considered a perfect support for a theory. There can be no valid formulation of a universal law based on some facts, since a theory must be based on facts and a description of the initial condition where those facts can be observed (Popper, 1979).

The questions of honesty and falsification are very different in the main different epistemologies like positivist, neo-positivist, interpretativism (and/or constructivism), post-Modernism, and so on) that we will present in next sections.

2.1.4. Epistemological Framework of Scientific Research

All of the above-mentioned debates require a researcher to think carefully about what epistemological view to choose. Here, epistemology can be understood as the science of analyzing the way human beings comprehend knowledge about what is perceived to exist (Burrell & Morgan, 1979; Niehaves, 2004). It addresses the question of how a person can arrive at 'true' cognition. However, there is no single theory or single philosophy of science that is binding for researchers. The individual selection necessitates an extensive overview of the epistemological assumptions made by individual researcher. There are some basic epistemological questions to be addressed in this part, based on the framework represented by Becker, Joerg and Niehaves (2005) in Table below.

And here these epistemological questions are going to be discussed in order to reach an understanding of the nature of problem of current project.

1.Ontological question: What is the object of cognition?

Ontology is the science, the theory or the analysis or investigation of 'what is' and 'how it is'. In the context of this epistemological analysis, ontology reveals its relevance in that objects are analyzed, to which the process of cognition refers. The process deals with the question of the way reality exists beyond the realms of pure imagination of the subject (Decker, Erdmann, 1999; Shanks, Tansley 2003; Weber, 2003).

a. If the researcher assumes a real world in his investigation, a world that exists independently of cognition, i. e. independent of thought and speech processes of the researcher, he thus assumes the position of (ontological) realism.

b. If the researcher denies the existence of a real world independent of human thinking and speech, that is, if he perceives reality as a construct dependent on human consciousness, he thus assumes the position of (ontological) idealism.

I. What is the object of cognition? (Ontological aspect)	*(Ontological) realism* A world exists independently of human cognition, for instance, independent of thought and speech processes.	*(Ontological) idealism* The 'world' is a construct depending on human consciousness.	*Kantianism* There exist entities that are independent from (noumena) as well as dependent on human mind (phenomena).
II. What is the relationship between cognition and the object of cognition?	*Epistemological realism* Objective cognition of an independent reality is possible.	*Constructivism* The relationship of cognition and the object of cognition are determined by the subject.	
III. What is true cognition? (Concept of truth)	*Correspondence theory of truth* True statements are those which correspond with 'real world facts.	*Consensus theory of truth* A statement is true (for a group), if it is acceptable to the group.	*Semantic theory of truth* A condition for truth is the differentiation of an object and a meta-language.
IV. What is the origin of cognition/Knowledge?	*Empiricism* Cognition originates from the sense. Such experience-based knowledge is called a posteriori or empirical knowledge	*Rationalism* Cognition originates from the intellect. Such non-experience-based knowledge is referred to as a priori knowledge	*Kantianism* Both experience and intellect are sources of cognition. Thoughts are meaningless without content; cognitions are blind without being linked to terms.
V. By what means can cognition be achieved? (Methodological aspect)	*Inductivism* Induction is understood as the extension from individual cases to universal phases, the generalization.	*Deductivism*. Deduction is the derivation of the individual from the universal.	*Hermeneutic* The understanding of a certain phenomenon is influenced by the pre-understanding of the entire/context.

Table 22: Epistemological Framework (Becker, Joerg & Niehaves, 2005)

2.The relation question: How cognition process is related to the object of cognition?

This epistemological question is about the relationship of cognition obtained by the subject to the object of cognition. The point is whether things beyond human thoughts and speech can at least in principle be recognized as objective. There could be two possible answers to this question:

a. Epistemological realism: In this realm, the objective cognition of an independent reality is possible. It claims that if the researcher can find suitable measures that are able to remove the effects of intervening variables, it would be possible to eliminate subject-dependent distortions of the cognition of reality (Loose, 1972).

b. Constructivism: Here, the understanding of cognition is subjective, i. e. "private" (Glaserfeld, 1986, 1987). The relationship between cognition and the object of cognition is thus determined clearly by the identifiable subject (Lorenzen, 1987, Wyssusek, Schwartz, 2003).

3.Concept of Truth: What is true cognition?

One of the main questions in epistemology is how a researcher can achieve "true" knowledge. In other words, how much of the "correct knowledge" are we able to obtain and how can we verify the "correctness" of the knowledge we obtained. These three kinds are Correspondence theory of truth, Consensus theory of truth, Semantic theory of truth.

a. Correspondence theory of truth. According to the theory of correspondence, truth causes a correspondence in terms of an analogy or equivalence between two relates. In this theory, two rings or 'relatum' are defined that we have to determine their relationship with each other. The first relatum is a statement and the second one is a fact. By correlating statements and facts, the former can be classified as true or false. Facts thus act as truth inducers for statements, because of their assumed status as objective. The capacity for truth determines the characteristic of statements.

b. Consensus theory of truth. The consensus theory of truth is a social variant of the epistemic truth concept. In its elemental form, truth results from the consensus of everyone (Apel, 1979):

   I. A statement is true if, and only if, it is rationally acceptable for everyone under ideal and optimal conditions.

   II. A variant of this thought can be, for example, that the range of truth is reduced. Under this condition, no longer is 'everyone' required for the consensus on the truth or falseness of a statement, only a group of a certain size. With this understanding, statements about truth are thus always to be understood relative to a group.

   III. A statement is true (for a group), if and only if, it is acceptable under ideal and optimal conditions for the group.

   IV. This concept of truth implies that nothing exists or proves to be relevant in the context of a test of truth, which would not be apparent to the community/group doing the perceiving. Within the search for consensus and truth, the existence of facts and things which are independent from thought and speech of the subject striving for cognition, are not necessary conditions.

c. Semantic theory of truth. The semantic theory of truth (Tarski, 1956) is based largely on linguistics and achieves clarity and precision of argumentation by using the compact instrument of modern semantics. Originally, the theory addressed the problem of self-referential statements that can result in logical paradoxa. Tarski (1956) argues that truth is not possible, if statements, expressed in a certain language, can contain predicates of truth regarding the statement itself. Thus, the semantic theory of truth suggests solving the problem of self-referentiality by applying two distinct languages: (1) an object language (L) in order to express a statement (s); and (2) a meta-language (M) in order to analyze the correctness of that statement in Table below.

	Language	Statement
Meta-level	M: meta-language, which contains predicates of truth regarding object language-based statements (e.g. English, German)	p: translation of the object language-based statement 's' into the meta-language M
Object-level	L: object language, which expresses the statement, whose validity has to be proven (e.g. ERM, eEPC)	S: the statement of the object language, whose validity has to be proven

eEPC, extended event-driven process chain; ERM, entity relationship model.

Table 23: Concept of truth according to the semantic theory

Tarski does not define the term truth. Instead, he expresses a condition for truth: the differentiation between object language and meta-language. Furthermore, it becomes clear that truth always refers to a language, the object language (L), and thus can only be understood as relative linguistic truth.

4.Source of cognition: Where does cognition derive from?

This question refers to our position regarding the fundamental capability to perceive. We obtain our cognition and knowledge from different sources:

a. Experience (impressions of senses): Experience-based knowledge is called a posteriori or empirical knowledge (Alavi, Carlson, 1989). The assumption of this source of cognition is often oriented towards natural science theory and practical experience and is represented by the school of empiricism.

b. Intellect: A subject can obtain cognition about an object through conceptual and intellectual efforts, which usually requires the use of a differentiation system. Non-experience-based knowledge is referred to as a priori knowledge. The assumption of intellect as source of cognition is represented by the school of rationalism, often also known as apriorism (Chomsky, 1965).

c. Conciliating positions recognize both experience and intellect as sources of cognition. According to Kant, none of these features has to be preferred to another. Without a sensory element, no object would be given, and without intellect, no one can be perceived. Thoughts are meaningless without content; cognitions are blind without being linked to terms. Thus it is also necessary as well; to make ones terms sensory (Kant, 1999).

5.Methodological Question: By what means can cognition be achieved?

This aspect refers to how humans perceive the truth. The question is what modes are valid for acquiring knowledge within a research process.

a. Induction: Cognition can be obtained inductively. Induction is understood as the extension from individual cases to universal statements, i.e. generalization. An inductive conclusion means the transfer from statements, obtained from observed or empirical cases, to a universal law, based on the assumption that there is homogeneity in nature. It is an a posteriori method which is often applied in the natural sciences.

b. Deduction: cognition can also be acquired through a deductive method. Deduction is derivation of a statement (thesis A) from other statements (hypothesis A1... An) with the help of logical conclusions. It is the derivation of an individual statement from universal statements and is applied, for example, in mathematics.

The presented set of questions suggests a basis for the epistemological discussion of research approaches and offers the chance to support a comprehensive comparison of particular assumptions made. Where appropriate, this list of questions should be extended to further issues (e. g. linguistic aspects).

2.1.5. Social sciences: More indistinctive boundaries

Social science has always been and will always be subject to methodological debate, since its main concern is not the phenomena that humans experience, but the human itself (Sassower, 1993). At a time when even natural science is not immune to uncertainty –theory of chaos, notion of randomness and instability even in the most elementary particles, Quantum theory in physics. It can be assumed what degree of controversy may exist in a field whose main focus is such a volatile and unpredictable entity as human.

For example, positivist social scientists use methods resembling those of the natural science as tools for understanding society, and so define "science" in its stricter modern use. Interpretivist social scientists, by contrast, may use social critique or symbolic interpretation rather than constructing empirically falsifiable theories, and thus treat "science" in its broader, classical sense (Flowers, 2009, Lakatos, 1974). In modern academic practice researchers often use multiple methodologies (for instance, by combining quantitative and qualitative techniques). The term “social research” has also acquired a degree of autonomy as practitioners from various disciplines share in its aims and methods.

As per Lakatos (1974), the correct scientific attitude is one that avoids pretentious 'insights' and has respect for conscious guessing which derives from human qualities such as courage and modesty. This attitude may allow us to overcome the above-mentioned scientific dilemmas.

The dilemmas of sociologic science cannot be resolved if we cannot agree on the very nature and definition of sociology. Before designing and implementing any research project, there are some basic questions that should be addressed.

- ✓ The first set of assumptions is ontological -- is reality external from conscious or a product of individual consciousness. Is reality given or a product of the mind?
- ✓ The second set of assumptions is epistemological -- what forms of knowledge can be obtained, how to sort truth from falsehood. Can knowledge be acquired, or must it be experienced?
- ✓ The third set is assumptions of human nature. Are humans determined by their environment, or do humans create their environment? (Determinism vs. voluntarism)

Each of the assumptions has important methodological implications. Two camps are objectivist and subjectivist. Objectivists examine relationships and regularities between the elements. They search for concepts and universal laws to explain reality. Subjectivists focus on how individuals create, modify, and interpret the world, and see things as more relativistic.

Burrell and Morgan (1980) described four main socio-philosophical debates:

Nominalism vs. Realism: The Ontological Debate:

Nominalism assumes that social reality is relative, and the social world is mainly names, concepts, and labels that help the individual structure reality. These labels are artificial creations. Nominalists believe that the mission of science is only to describe how things behave. This is done by freely introducing new terms and changing the definition of the older terms whenever necessary.

Realism assumes that the real world has hard, intangible structures that exist irrespective of our labels. The social world exists separate from the individuals' perception of it. The social world exists as strongly as the physical world. We can say that Aristotle was the father of realism, because he thought science should penetrate the essence of things in order to explain them.

Anti-Positivism - Positivism: The Epistemological Debate:

Positivists believe that one can seek to explain and predict what happens in the social world by searching for patterns and relationships between people. They believe one can develop hypotheses and test them, and that knowledge is a cumulative process. In other words, they believe that the basics of natural science methodology can be applied to the social science as

well. David Hume, August Comte and John Stuart Mill are some of the main advocates for this approach.

Anti-positivists reject that observing behavior can help one understand it. Since social world is relative, each researcher must experience it directly from his/her own point of view. They reject that social science can create true objective knowledge of any kind, and therefore social science is essentially a subjective rather than objective arena.

Voluntarism vs. Determinism: The Human Nature Debate:

Are humans determined by their environment, or do they have "free will"? This is a question that is actually rooted in natural science. When Newtonian physics had total supremacy, scientists believe that it can explain everything; i.e. the destiny of the physical world and its components are all pre-determined and can be predicted with absolute precision using Newtonian laws.

The downfall of classic physics and the rise of quantum physics -with its implicit notions of uncertainty, chaos, and unpredictability- gave way to indeterminism. This shift was so welcome for psychologist and philosophers because it was an evidence for human freedom (Popper, 1979). According to the voluntaristic view, humans are totally autonomous, while in deterministic view, man and his activities are determined by heredity and environment.

Ideographic vs. Nomothetic Theory: The Methodological Debate:

Ideographic inquiry focuses on "getting inside" a subject and exploring their detailed background and life history. They involve themselves with people's normal lives, and look at diaries, biographies, and observation.

Nomothetic theory relies more on the scientific method, and hypothesis testing. They use quantitative tests like surveys, personality tests, and standardized research tools.

There is evidence that different academic disciplines and different research communities tend to develop distinct approaches and tend to make distinct assumptions (Chen & Hirschheim, 2004). Chen and Hirschheim have conducted an empirical study analyzing eight major is publication outlets between 1991 and 2001. The examination of 1893 articles published in US journals or European journals shows that the vast majority (89%) of US publications is influenced by a positivist paradigm.

Though European journals also publish 66% research based on positivist principles, they tend to be much more receptive to interpretivist research (34%) than US journals are. Those paradigms are based on distinct epistemological assumptions. The differences on a paradigmatic level consequentially lead to an epistemological difference in alignment (Hirschheim & Klein, 1989; Chen & Hirschheim, 2004; Niehaves, 2004; Becker, Niehaves & Klose, 2005).

2.1.6. Paradigms of organizational studies

Burrell and Morgan (1979) tried to classify and provide a framework to understand the existing sociological theories and approaches in organizational studies based on four major paradigms. They included these paradigms into a 2x2 matrix. These paradigms are based on four main debates in sociology:

- Is reality given or a product of the mind?
- Must one experience something to understand it?
- Do humans have "free will", or are they determined by their environment?
- Is understanding best achieved through the scientific method or through direct experience?

The four paradigms represented by the quadrants of the matrix are (Figure below):

Functionalist Paradigm (objective-regulation)

This has been the primary paradigm for organizational studies. It assumes rational human action and believes one can understand organizational behavior through hypothesis testing. It is a problem-oriented approach, focused on providing practical solutions to practical problems. This paradigm is more compatible with an objectivist approach to social science since it is realistic, positivist, and nomothetic.

Interpretive Paradigm (subjective-regulation)

This paradigm seeks to explain the stability of behavior from the individual's viewpoint. It advocates that ‘individuals’ are the ones who create the world in an ‘on-going processes’. Researchers in this paradigm try to better understand individual behavior and the ‘spiritual nature of the world’. The ontological viewpoint in this paradigm is that of nominalism; i.e. there is no reality in the social world per se. Philosophers like Kant formed its basis, and Weber, Husserl, and Schutz furthered the ideology.

Radical Humanist Paradigm (subjective-radical change)

Theorists in this paradigm are mainly concerned with releasing social constraints that limit human potential. In this view the consciousness of man is dominated by the ideological superstructures with which he interacts; these superstructures in fact prevent human fulfillment. They see the current dominant ideologies as separating people from their ‘true selves’. They use this paradigm to justify desire for revolutionary change. It's largely anti-organization in scope. This paradigm has close connection with the interpretive paradigm, since it also has an anti-positivist, voluntarist and ideographic perspective toward the social world.

Radical Structuralist Paradigm (objective-radical change)

Based on this paradigm, theorists see inherent structural conflicts within society that generate constant change through political and economic crises. Unlike radical humanist

paradigm which sees 'human consciousness' as the basis for radical change, structuralists focus on the role of different social forces and structural relationship. This has been the fundamental paradigm of Marx, Engles, and Lenin.

Sociology of Radical Change

Subjective	**Radical Humanist Paradigm** Anti-organization theory	**Radical Structuralist Paradigm** Radical organization theory
	Interpretive Paradigm Hermeneutics, ethno-methodology, and phenomenological symbolic interactionism	**Functionalist Paradigm** Behaviorism, determinism, and abstracted empiricism

Objective

Sociology of Regulation

Figure 36: Four paradigms in organization theory. (Adapted from Burrell & Morgan, 1979).

2.1.7. Epistemological implications of current research

Every research, either fundamental or applied, begins with a problem and a question. This question is basically theoretical in fundamental research, and practical in applied research. However, this does not mean that these two types of problems and researches have nothing in common. In fact, almost any applied research should consider the theoretical framework that it's based upon. Applied organizational research projects are no exclusion.

Each researcher tends to establish his work on an appropriate theoretical foundation. But when the areas of research multiply, it would be hard to find one meta-framework that could bind all methodologies together and encompass all practical solutions. This leads to conflicts in the realm of epistemology and ontology. In this chapter the main branches and schools of epistemology briefly reviewed. A more detailed review is far beyond the scope of this manuscript.

In another hand accounts of the virtual organization are almost invariably concerned with defining the virtual organization in contradistinction to earlier forms, and they are often constructed around the assumption that the virtual organization should be reviewed as an emergent new paradigm. Information technology as associated with the creation of new business opportunities, marketisation, de-bureaucratization, value chain analysis, moves away from Taylorism, and calls for the moral fabric of the organization to be overhauled.

Enthusiasts regard the virtual organization as synonymous with new business opportunities, technological innovation and organizational change. As with earlier developments in the field

of information technology, and with currently influential representations of 'cyberspace', proponents of the virtual organization are concerned with the innovative potential of vastly increased information flows. Information technology is closely associated with improvements in the control and coordination of core activities; functional integration, quality levels and responsiveness. Cyberspace and virtual working have been associated, in a second strand of thinking, with fragmentation and social atomization. This new virtual forms offer the possibility of establishing new social employer-employee relations based on trust and cooperation.

Beside these challenges the main objective of this study analyze the conditions of performance of the VOs, through the study of the different models of excellence in organizations, particularly models specific to VOs. This study will lead us to comment and propose improvements to a model of excellence for the VOs. This goal makes radical humanist and radical structuralist paradigms unsuitable for the current project, since we are trying to study the behaviors of the Virtual Organizations, not seeking to impose radical changes in virtual organization, the way they are managed, or how they perform. Although the epistemological view have been chosen, researcher is not committed to any believe, as Popper and Kuhn both believe that commitment to one belief is unacceptable.

Now only interpretive and functionalist paradigms are left. On the one hand, the study questions and objectives implicitly assume that organizational world is nothing but what is created by individuals. Individuals (VO managers, team managers and team members) are the ones who create the VO, and work within it. On the other hand, we are answering some question and examine hypotheses with a problem-solving approach. Using a survey would be justifiable with this view, which is more compatible with the positivist epistemology –similar to what is applied in natural sciences.

2.2. Part 2 : Data collection process

In chapter 1, we reviewed virtual organization characteristics trough several available models and studies. Then we discussed EFQM excellence model framework in detail. At the end as the result of extensive literature review we collected the 302 statements which were directly related to productivity and excellence in VOs. In this section we have four purposes:

(1) To describe the research methodology of this study,
(2) To explain the sample selection,
(3) To describe the procedure used in designing the instrument and collecting the data,
(4) To provide an explanation of the statistical procedures used to analyze the data.
(5) To acknowledging the limitations of data collection

So after explaining the problems we are trying to address and questions we are trying to answer, we will describe the questionnaire that got designed in this process and at the end we will define methodology and a description of steps taken in data collection and analysis.

2.2.1. Problem Definition

Besides our discussion regarding the necessity of having an excellence model for virtual organization in chapter 1, here we are going to discuss a bit more about propose of research and fit methodology for it.

The management of organizations in a complex and changing world presents a major challenge. Making sense of conflicting priorities, allocating limited resources, understanding the impact of the organizations actions, comparing performance with competitors and responding to customer needs are just some of the issues management have to address. Balancing the effort of the organization to address these and the many other issues and challenges faced can be a daunting task. The concept of globalization on one hand, and the speed and influences of advancements in communication and information technology on the other, have confused everybody in the world today. In this situation, the traditional organizational life, which may have been more convenient, predictable and controllable, is no longer possible. Current circumstances imply a fundamental change in organizational performance.

For many organizations there is no time to adopt a systematic approach to the challenge. Some organizations seek solutions that avoid the complexity described above. They search for the solution, the initiative that will provide the answer and magically transform their performance and create success. Business Excellence is all about making organizations perform better; produce better profits; achieve success; deliver its aims .A set of principles and tools that can be used to improve any organization, but as is the case with any tool it can also be misused and its value diminished or lost. It’s about delivering real bottom line improvements in performance to private and public sector organizations. How about Virtual Organization? Do they need an Excellence model?

To be successful, argue Goldman et al. (1995), each firm must focus on achieving world-class excellence. Virtual Organization as a new form of enterprises must have a roadmap toward this excellence. Having Business Excellence model and benchmarking based on it, provides the path for success in today's and tomorrow's world.

Among all of the quality and Excellence models in the world, EFQM Excellence Model is a widely used organizational framework, with about 30 000 organizations using it. In recent years, more and more countries started implementing the Model, especially across Middle East, Asia, Africa and South America. But how many of the enterprises that got assessed based on this model was Virtual organizations? According to the difference between Virtual and Traditional Organizations, there must be some difficulty and challenges while implementing EFQM in a VO!

That is Obvious, these organizations has its own characteristics which affect the way they need to change to be more productive. The necessity of having and Excellence model for Virtual Organizations is:

1. The available EFQM model designed for traditional organizations and it does not fit the VOs.
2. A special VO excellence model will have major impact on competitiveness and performance of a VO.
3. VO excellence model is relevant for long-term competitiveness and sustainability, and only minor changes to the design of the frameworks (if any) are needed.
4. VO excellence framework is over-arching frameworks within other initiatives/quality tools fit
5. Focus on implementing the core concepts of excellence by assess where a VO is on its journey.
6. Virtual Organizations can benchmark and learn from best practices in their market.

The objective in this study is to create an excellence a Model for Virtual organizations .In this regard, based on EFQM assessors hand book a questionnaire got designed to be the bases for this survey.

2.2.2. Research Methodology and Design

This research adopted a pluralist (4-stage) approach. The use of multiple methods such as surveys and field experiment increases the reliability of the study. The first stage of this study engaged extensive literature review to develop and create a preliminary framework and foundation for Excellence in Virtual Organization. The second stage of this study employed the field experiment to study the preliminary framework. The third stage involved the use of survey to validate and further refine the preliminary framework developed earlier.

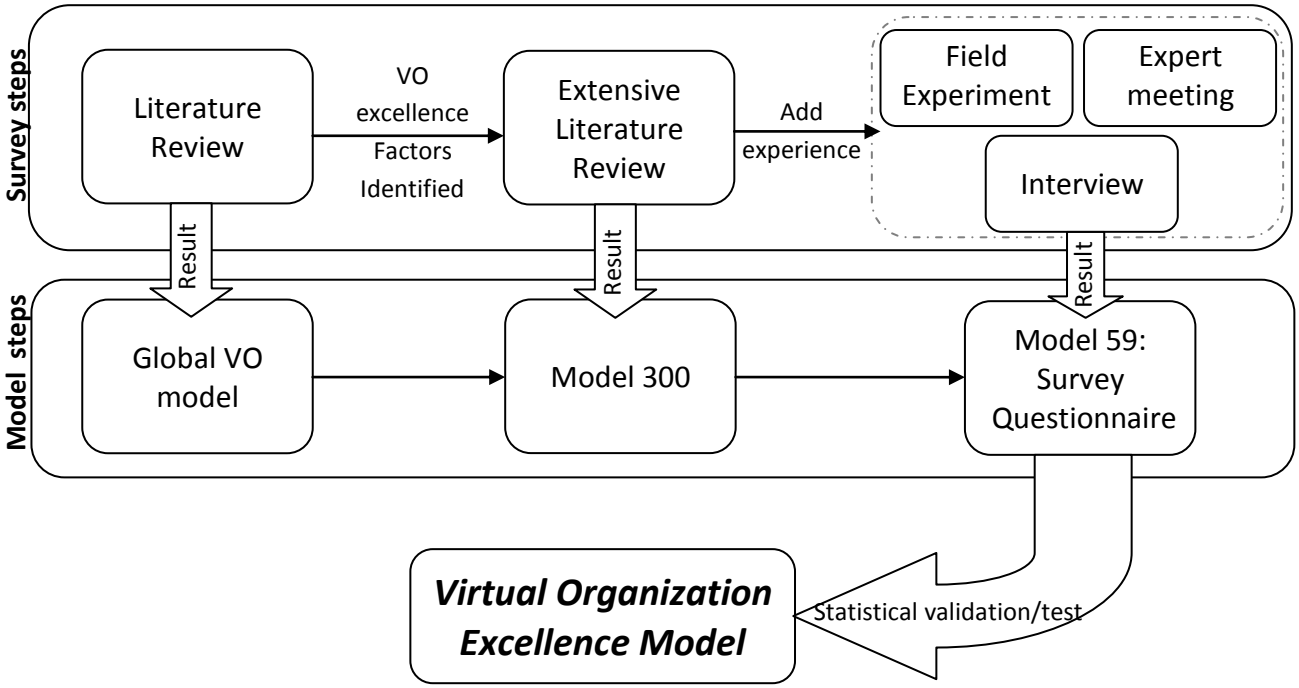


Figure 37 : The research process

We used multiple sources of data and several methods of data collection. These data sources and collection techniques supported a holistic perspective on a Virtual Organization excellence phenomenon. Picture below shows the position of theory fundamentals in this research .This method also reduced researcher's bias since fundamental data for claims were linked to multiple sources.

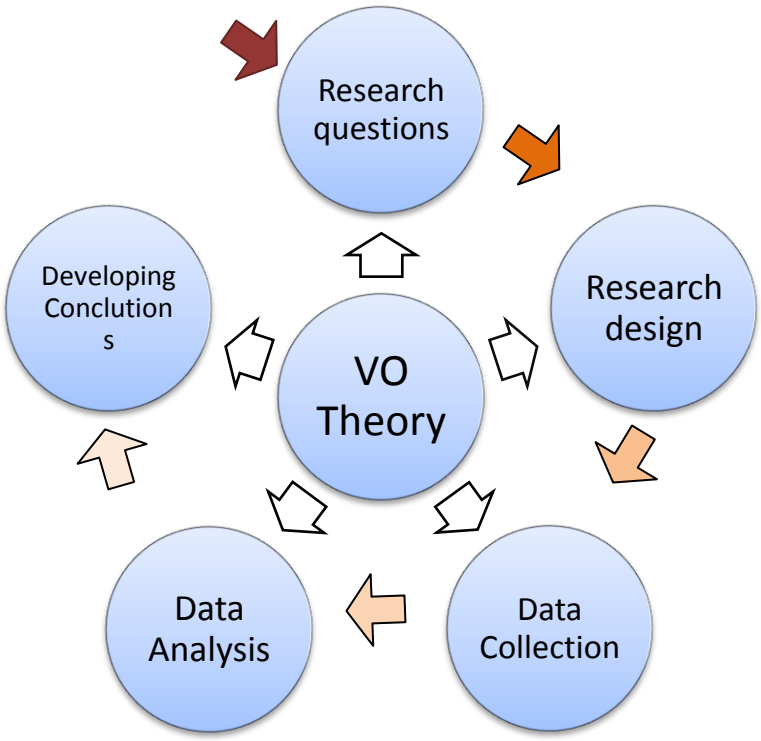


Figure 38 : position of theory fundamentals in this research

As we discussed in chapter 1 the Virtual organization excellence questionnaire was developed to evaluate different aspects of VO productivity according to the evidence in the literature review. As we discussed in EFQM section in chapter 1 there is a certain kind of assessing manual available for EFQM assessors to go and assess organizations. We have also discuses about history, development, description of this manual and the logic behind. Extensive literature review showed that we need to design a specific questionnaire for virtual organizations as EFQM 2013 was designed to cover all the aspects of a traditional organization and was not able to adapt to the nature of VOs.

Researcher also backed this thought by admitting that designing a framework for assessing VO effectiveness is challenging. Since technology profoundly affects the nature of group work (DeSanctis 1987, Huber, 1990), it is inappropriate to generalize the outcomes from traditional enterprises to virtual organizations. So we felt that there is a great need to have a specific questionnaire for assessors to give them a clear vision of a VO and the criteria that they must consider while assessing them.

2.2.3. Field experiment

A field experiment is a method that involves experimental design but without experimental controls and manipulation of independent variables and is carried out in the natural settings of the phenomenon of interest. Ross and Blasch (Ross, 2002) emphasized that field experiment, are particularly useful for studying novel, variable and less understood situations, such as in the factors which impact on virtual entity success.

In order to start field experiment, we started negotiating with 6 Virtual enterprises and teams. This negotiation started in March 2012 and continued throughout the year. Due to some security problems these enterprises did not give us the permission to access all the transaction and communication of the firm. There was not any other firm left so in Feb 2013, we decided to build and develop a virtual organization and create this possibility to have access to all the data and experiment this subject from closest point of view.

We chose an application development event in Tehran to pitch an idea and asked web developers and business specialist to come and participate in developing that. By developing this application we try to stabilize training materials in student's mind (quite similar to the Leitner box). We called it "Tstab" in the first place. The idea got chosen in this event as the 4th priority of the event and a team from across the country volunteered to work in this team.

Tstab was a mobile applications development start up that was born in Tehran, with 7 smart, talented, and yet humble engineers, designers and product architects. Entrepreneurship and creating a useful product was a biggest drive for all Tstab energetic and passionate members.

This team started R&D process for this application although members where from different part of the world. In order to make video conference and Virtual meeting possible researchers chose Asana website as a framework to communicate, among 21 other competitors like

Basecamp ,Binfire, Bitrix24, Ceiton, Clinked, Central Desktop, DeskAway, DropTask ,eXo Platform , Eylean Board, Ganttic etc.

Asana is designed to enable individuals and teams to plan and manage their projects and tasks virtually. Each team gets a workspace. Workspaces contain projects, and projects contain tasks. In each task, users can add notes, comments, attachments, and tags. Users can follow projects and tasks, and, when the state of a project or task changes, followers get updates about the changes in their inboxes.

The reason for choosing asana was because Asana could adapt to enterprise scale: from hundreds to thousands of employees. Along with the launch of Organizations there will came new capabilities including Team Browser like a unified view of a person's My Tasks and inbox, employee auto-join and IT administration abilities related to provisioning and permissions. Also Asana was one of the first websites that made it easier for teams to engage in various types of communicative activities relatively implicitly.

Each individual in Tstab was multitalented and multi skill, they had developing skill, web design, academic education 2 -5 years of work experience. In the first days members were all inside Iran but after couple of month 2 members from USA and India joined us. Then team agreed on a group chat or video conferencing using ICT framework. First team started to create an expertise bank that enables other members to see and use that ability at the right point. Researcher as the head of the team tried to communicate with each group member one by one and ask about the technological challenge that they have. One of the main challenges was how to team them for a project and assigned them a proper task. During this process we faced many challenges and Appendix C (Pictures) shows a small part of Tstab activities in Asana website.

In Tstab members tried to avoid communication gaps. The entire members tried to build a trust culture in order to solve problems caused by miscommunication. For example If a member send an email and receiver didn't respond, they were usually aware that it's because that members is not online or maybe he or she is traveling and did not have access to internet. Constant feedback was one of the first solutions that were available to avoid any conflict.

To avoid this kind of communication gap, team made some agreements about norms for response in various media (email, phone messages, voice mail, and fax). This agreement was in both sides for example how the recipient of a message will be acknowledged and what you can expect from one another in terms of a response. Also develop a system for alerting one another ahead of time if you will be disappearing from the communications grid for more than a day or two was one of the solutions so everyone else will know what to expect.

There was a clear rule that “if you can't respond substantively to a message right away, at least let people know immediately that you've received the message and when they can expect a response.”

Tstab team found that the biggest challenge was its “Leadership” because team members were separated by distance and time and leader can't afford to assume that team cohesion will develop on its own. There were too many obstacles in this case and it requires conscious thought and effort by all team members, but the results can be powerful.

2.2.4. Survey and interviews

At the last step of the research, conducting survey was chosen because it allows systematic information gathering from participants for the purpose of understanding and predicting some aspects of the behavior of the population so we developed a questionnaire to evaluate productivity and excellence in Virtual Organizations.

This process started by the result of Extensive Literature Review so called “model 300”. It is clear that it is almost impossible to have a 300 item questionnaire, so we tried to decrease the numbers of statements to come around 50, to be compatible for making a questionnaire. But reducing factors from 300 to 50 was a big challenge itself. We invited virtual organization and excellence management experts to come and analyze each of factors and gave them a better shape.

To make this happen we had to choose a proper place to hold this meeting and also invite experts to attend. With help of a Berkeley University Psychology graduate, we got the permission to use one of the classes in the Department of Psychology from 17:00 to 20:00.

The next challenge was to invite experts, so invitations have been sent to the database of experts who have been collected for the pas 9 month. Finding Virtual Organization experts was not a big challenge because due to the Silicon Valley culture and strong IT industry community there were many experts who had enough experience as a national and international VO member for many years. Also there where many experts who were currently working in a VO start up and done all the duties remotely and only once in month could get chance to meet other colleague.

The main challenge was to find organizational excellence managers or experts who had good understanding of quality management concept and the implementation of it. As it have been discussed in chapter 1, we chose EFQM as the last expression of the dominant approach of excellence which is TQM to work based on it. So we needed to invite EFQM experts who lived inside United States! The challenge was to find European model experts inside USA. But with help of social media like Facebook and LinkedIn and couple of referrals, I found 3 EFQM experts who lived around and agreed to attend in this meeting.

The meeting held on 29 August 2014 .In the meeting one of the EFQM experts could not make it and did not attend in the event but she was with the group following the discussions, using Google Hangout. At 17:10 meeting started. Members where already received resume of researcher and director of these. We started by explaining what happened during last 4 years and the current stage of study and the purpose of this meeting. All the members’ received a page to fill their name and information to reflect in the dissertation. Unfortunately none of

them gave us this privilege to mention their name due to the position that they currently had in their industry. We even explained that the only reason to ask their name is to show our gratitude to their contribution and how much their help mean to us. We also used the Google drive to share documents while it was being edited and share it among user so they can see the result of their discussion right away.

The meeting continued discussing about creating the same perspective over VO and excellence model (EFQM). Result of the Extensive Literature Review "300 model" got a bit more discussed. The challenge in this part was to create a same vision over the Excellence subject within VO and EFQM experts. One of the VO experts believed that most of the VOs are smaller than what we think and applying an excellence model may cause other problems that can decrease effectiveness. This issue was addressed by one of the EFQM assessors and this helped VO expert to have a shared vision over the topic.

We were one of the participants but consciously did not attempt to play a role in the discussion (to have a better chance to observe what is going on). But in some moments there was a great need to clarify some subjects in order to move forward so we added an explanation. After the first round of quick review of the "300 model", the group agreed to cover each sentence and assign each with a category and a point that they are referring to. Although there was not any standard categorization for VO the group decided to get them as close to EFQM as possible to remain in the same area.

One of the biggest challenges in the first round was to come up with the united title for the categories. Although there were couple of them which was much easier like "Leadership" , "teams" and " ICT" but there were moments that group could not agree on one title. For example team spent 10 minutes to agree on a same title for this statement: "To gather and update a deep market analysis in a VO". One of the EFQM experts suggested on "Market" and one of the VO expert suggested "Environment"! Then discussion targeted the fact that we need to come up with the names that can reflect a sense of the whole category not only one aspect.

After the first round of 300 points, which took around 2 hours, the first image of the whole model became much clearer. By sorting out the title it became clearer what the group came up with.

Category of evidence in literature	Frequency	Category of evidence in literature	Frequency
Communication	15	Security	7
Content	10	leadership	71
Customers	11	Process	24
Feedback	1	Result	39
Supplier	6	Trust	15
Software issues	28	Teams	67
Hardware issues	8	TOTAL : 302	

Table 24: model 300 detales

In the second round the group just summarized each section and compared sentences using the point that they were emphasizing on. At the end of this round the model downsized and to 85 statements. Although the meeting finished at 20:00 but group agreed to continue sharing comments of outcome of this meeting.

Subject	NO
Knowledge	8
Environment (Customers, Suppliers , competitors …)	11
ICT framework	15
Leadership	14
Process	10
Result	12
Teams	15
TOTAL	85

Table 25 : Statement grouping details of first round questionnaire design

At the end of meeting each received a greeting card along with a gift card for Pegasus Books Downtown Berkeley as a gesture for our gratitude for their help and contribution to this study.Based on meeting comments and field experiment we merged some of the statements and reduced the number of points to 59 (related to 7 different categories in VO literature). Then we compared statements to the current EFQM assessor's handbook and rewrite them to be more appealing. Beside these 59 questions 3 other parts were added to the Questionnaire.

1. Virtual Organization Excellence Model Survey introduction. Containing a brief description about VOs, EFQM excellence model, Purpose of the study, importance of expert's participation, researcher's information and background, the necessity of honest participation and direction to fill the questionnaire.
2. Ranking the Virtual organization excellence model main factors.
3. Demographic questions.

In the main part participants were asked to use a 10-point Likert scale in scoring the statements and at the end an empty space was left to allow for further comments to be made. Considering the nature of the study and dispersion of VO members, researcher needed an Electronic version of the questionnaire. Among all the websites available for this www.kwiksurveys.com , got chosen and the main questionnaire got created online.

Two follow-up mailings were carried out to increase the response rate. According to kwiksurveys.com, total of 384 questionnaires were completed online. The questionnaire was composed of 3 main parts and the measurement items were all related to the seven variables (constructs) identified earlier.

As part of the process in designing the study, the researcher conducted 8 preliminary interviews with experts in the field of Virtual Organization and EFQM excellence. The experts represented key participants from a variety of consulting companies. This is

important to mention that 5 of them were directly involved with a Virtual firms and 3 other experts were EFQM assessors.

The purposes of the interviews were to:

- Find out about the preliminary background on Virtual organizations excellence models
- Investigate whether research on the topic is warranted
- fill the questionnaire and discuss regarding the characteristic of it

These interviews informed the researcher's preliminary understanding of the lack of enough general knowledge about Virtual Organizations and there strong need for that. Also interviewer felt a strong need to have few minutes dedicated to EFQM Excellence model and create a unique perspective for interview. The interviews confirmed the researcher's perception that the urgency of this study.

2.2.5. Research Objectives and questions

In chapter 1 we discusses about the literature of Virtual organization in detailed. We analyzed concepts of Virtuality, VO characteristics, Virtual Teams, Traditional teams vs. VT, Communication, V-leadership, Virtual control, ICT, Security, Trust, VO's Life cycle and VO Effectiveness. Then in the next section we analyzed the total quality management models and discussed about EFQM model in detail. In the last section of chapter 1 we studied the literature extensively from the productivity and excellence models perspective.

At the beginning of this chapter we identified the gap that we wanted to fill and based on it designed some primary and secondary objective of this study. This study's primary objective is to identify the main factors that affect the productivity of a VO and develop a model based on these factors. After Extensive literature review, field experiment and interviews we identified 7 main factors and the final step was to design the related question for each to test their validity and move with the research process. Here there are primary and secondary objective and questions of this study:

Primary objective

Identify the most important factors of Virtual Organization productivity and creating an Excellence model for VO.

Secondary objectives

1. Evaluate leadership's effect in VO Excellence
2. Evaluate Virtual Team's effect in VO Excellence
3. Evaluate Knowledge's effect in VO Excellence
4. Evaluate ICT framework's effect in VO Excellence
5. Evaluate Process's effect in VO Excellence
6. Evaluate Environment's effect in VO Excellence
7. Evaluate Results and feedback effectiveness in VO Excellence

Primary Questions

To what extent Virtual organization Excellence model is similar to the current and available EFQM excellence model?

Secondary questions

1. Dose leadership has effectiveness in VO Excellence
2. Does Team has effectiveness in VO Excellence
3. Dose Knowledge have effectiveness in VO Excellence
4. Dose ICT framework has effectiveness in VO Excellence
5. Dose Process has effectiveness in VO Excellence
6. Dose Results and feedback have effectiveness in VO Excellence
7. Dose Environment has effectiveness in VO Excellence

2.2.6. Sampling & Data Collection

The objective of sampling for survey research is to produce a sample that is representative of the population under investigation and from which generalizations can be drawn. One rule of thumb for determining an adequate sample size for descriptive research is that it should consist of 10 to 20% of the population under study (Gay, 2003). Gay also suggests that as the size of the population increases, the proportion needed for an adequate sample decreases. For example, with sample sizes for populations of 100 or less, 100% should be surveyed; for populations consisting of 500 subjects, the sample should be 50%; for populations containing 1,500 subjects, 20% should be sampled; and for populations of 5,000 or more, a sample of 400 is adequate (Krejcie & Morgan, 1970). The chart below suggests the great benefit that randomly-selected samples afford. (Population size is noted by uppercase "N" and sample size by lower case "n".)

N	n
50	44
100	80
500	217
1000	278
1500	306
3000	341
5000	357
10000	375
50000	381
100000	385

Table 26: Random Sample Sizes (n) Required for Population (N) Representation

Considering different kind of virtual organization in the world such as local, National or International that functions toward their goal and produces a product or services, the size of the sample that we can chose was not clear. We used Krejcie & Morgan (1970) method and targeted having 400 responses for the questionnaire. The biggest limitation here was time.

Right after beginning of the process of informing experts about the questionnaire, there was a great positive feedback. Experts were willing to answer to our request but due to time limitation we considered 384 responses and stopped taking other answers here in this research. 32 of the responses were incomplete so at the end we had 352 responses that are still in the acceptable range of Krejcie and Morgan.

Our aim was to collect the data from Virtual Organization experts and EFQM assessors and experts. In order to send the questionnaire to target participants we needed an authorization from IAE, Lille 1 University and especially from the director of the research Professor Dominique Besson. After receiving this authorization we started communicating with 4 major communities of VO and Excellence in the world to help me send the questionnaire to their members. Two of them rejected this request but one VO and one EFQM network agreed to help us.

The method of e-questionnaire is used in this research. Using a specific website called kwiy survey was the easier, faster and more organized way of delivering the questionnaire. This particular instrument has been chosen due to the unique characteristics of the study population and the efficiency of data collection. The survey was consisted of 59 multi-option close-ended questions formulated aiming to ensure more in-depth information is provided. The questions are formulated based on the objectives, research question and hypothesis of this research. The questions will follow a logical progression starting with simple themes and progressing to complex issues to sustain the interest of respondents and gradually stimulate question answering.

After developing the questionnaire on the website we generated the unique link for the online survey page and added a one-page introductory letter to it. This cover letter was attached to the survey to explain the purpose of this research and its relevance, and to seek their agreement to participate in this research. Contact information of the researcher has been provided in case a respondent has any questions.

This letter included introducing researcher, the subject of the research, and request for the recipient to fill the questionnaire. Each person received an individualized email containing a URL address to the questionnaire that could be accessed only by the person with access to that specific email address.

This site automatically tracks the number of answers, and did not let any person to fill this more than one time. All correspondence was totally confidential and we were the only people who had access to the responses. This was the first attempt and in the second round was when we targeted the Virtual Organization experts and EFQM assessors in LinkedIn. The data collection activities resulted in a wealth of qualitative data. Although this caused two primary challenges for the researcher that was management of the data, and analysis of the data.

The feedbacks of the surveys collected from the period between 15th September, 2014 and 14 Nov, 2014. The data has been recorded by kwiksurveys.com and updated simultaneously as responses are received. The results have been organized in the website and were available to be downloaded into Microsoft Excel spreadsheet with the code that has been developed to

measure the location. The responses of each question have been assigned with numerical values for the data analysis. Total collecting data from experts took around 2 month. The source and number of responses we received are provided in the table below.

Message	Source	Number of responses
Sharing the URL of survey	VO community	42
Official invitation to Virtual Organization Excellence Model Project	EFQM community	89
Virtual Organization Excellence Model survey	Email database	70
Official invitation to Virtual Organization Excellence Model Project	LinkedIn	183
Number of responses received		384
Surveys with less than half answers		32
Final survey completed		352

Table 27: Messages, Source, Number of responses received for Virtual organization excellence Questionnaire.

Table below summarizes the sources of data and the utility of each type of data.

Data Source	Type of information	Utility of information	Purpose of
Literature source material	Text base data in 3 form: - Literature of 2 subjects - Other researches Records; - Historical models;	These information's provide bases for Extensive Literature Review	Assisted in discovering Models , methodologies , perspective and history of activities, entities
In field experience	Experience base data: Find aspects of VO which did not mentioned in Literature Researcher's Field Notes (Observations and Experience of Individuals, Events, Activities, and Process	Help to categorize and filter factors outlined in previous step. Experience of being in a VO in the natural context of the people and activities involved.	Assisted in interpret and understand data collected in the guided interviews.
Survey	Informative data about Participants' opinion Their personal projection of subject Willing to help VO to get more productive	Using this data to create a model for VO excellence	Assisted in discovering activities, entities, processes, and forces, and the contexts that influenced, enabled, or constrained a VO

Table 28 : Type and Utility of Data from Each Data Collection Activity

The multi–method approach for the study's data was to maximize the range of information available to the researcher, improve the trustworthiness of the data. Each data source and technique had particular advantages and disadvantages, and by using a combination of sources and techniques, inadequacies of one source or technique was supplemented by the advantages of another source or technique. The combination of data sources also provided a mechanism to gain different perspectives on the Virtual Organization productivity like official records, personal interpretations, and direct experience with the process of creating and life cycle of a VO.

2.2.7. Questionnaire: structure and content

We used "Virtual Organization Excellence "questionnaire as our data gathering tool. As mentioned in previous section this questionnaire is consisted of 59 statements that address the essential process and functions that effects productivity and excellence of a VO. Appendix B shows this questionnaire.

Each of these 59 statements belongs to one of the 7 categories as below:

- Statements number 55,49,11,16,47,27,33,39 and 50 measure 'Environment ' factors;
- Statements number 2, 45,12,48,18,25,51,41 and 56 measure 'ICT framework' factors;
- Statements number 1, 10,26,28,32 and 17 measure 'Knowledge' factors;
- Statements number 3, 6,58,52,19,46,29,34 and 40 measure 'Leadership' factors;
- Statements number 4,7,13,53,20,24,30 and 35 measure 'Process' factors;
- Statements number 5, 8,54,15,44,22,57,37 and 42 measure 'Results' factors;
- Statements number 59, 9,14,21,43,23,31,36 and 38 measure 'Teams' factors;

The questions of the survey have been designed to test the 7 hypotheses of this thesis. The wording of each question has been organized according to the multi-dimension constructs for the measurements of each factor derived from previous research. For more information of the research instrument, please refer to Appendix B: Virtual Organization Excellence Model survey.

We also added a Ranking question where participants could rank 7 main factors freely. There was also an open ended question asking if participants want to add a category to those mentioned in the last question. And as the last question in main Part of questionnaire participants asked if they think the current and available EFQM Excellence Model can be used for Virtual Organization assessment. After reviewing all answers to each of these questions, we classified answers into a number of categories; i.e. responses that delivered a similar opinion were gathered in a group. This process was done by the researcher and confirmed by an independent reviewer.

Here this is time to focus on the questionnaire that we built based on the thesis objectives and the study of literature, field experiment and interviews (Appendix B). The questionnaire was structured in two parts comprising a total of 66 questions. The first part of the questionnaire was devoted to collection of Virtual organization excellence data. The second part of the questionnaire was designed to gather respondent's information. A series of questions in the questionnaire were designed as closed questions with single response quantified using a Likert scale with 10 possible answers, which asked respondents to indicate the importance of that statement. The reason of using symmetric scale was to eliminate the tendency of respondents to a neutral position.

In this section we are going to analyze statements of the questionnaire in 7 groups of factors affecting the performance and quality. In each section we are going to first assign some indicators for each statement and then underline their evidence in the Literature review. Then in each section we will cover the field experiences related to that specific category along with

some of the points that have been shared with us during the interviews and in the group meeting.

There is an important explanation of how this questionnaire got this final look. In the Literature review and Extensive Literature Review most of our effort was to find important factors on performance and excellence of a VO, but most of the time we needed to keep in mind what is the origin of this statement. For Example "the ICT frame work must be Task-technology fit" statement shows a specific quality that VO's ICT framework must have but we could not put it directly in the ICT category because the origin of this statement is going back to Leadership's role to decide which ICT framework is suitable for this VO.

So in the questionnaire there are statements that must seems that it is better to be in other categories and this was the reason why we move them to other place.

2.2.7.1. Nine Leadership statements in questionnaire:

Here we will analyze the 9 statements of "Leadership" dimension in Virtual organization excellence model questionnaire as listed in table below.

Id	Leadership Statement	Sub-indicator
L1	Leader creates clear strategy, policy, mission, values, goals, objectives, culture, behaviors, performance metrics, and VO governance principles, quality improvement rules, based on the present and future expectations of all stakeholders. Leader also should review and update them periodically	VO strategy, VO rules, VO mission Performance metrics,
L2	Leaders participating, supervising, supporting and giving feedback about continuous excellence improvement processes based on content of ICT framework.	Feedback giving Supervising
L3	Leader chose the most appropriate and suitable ICT framework for VO.	Task- technology fit
L4	Leaders handling all interactions with suppliers, partners, competitors and society including finding, negotiating and e-contracting (information, pre-contractual, contracting, and enactment phases).	Supply chain management, E-contracting negotiation
L5	Leader clearly determining VO's structure, business/collaboration process modeling, access levels (assets/resources, intellectual property, etc.) for each position using best potentials in ICT framework.	VO structure, VO process, Access levels
L6	Leaders clarify communication protocols (what, to whom, when, and how), supervise and give feedback.	Communication protocol Communication feedback
L7	Leaders clearly defined job descriptions, performance appraisal, career development, compensation, flexible work arrangements, recruitment, training, professional skills development, benefits and compensation, ensuring legal compliance according to VO's policy and strategy.	Job description, Recruiting, compensation
L8	VO Leader is more a coach and moderators of functions, they are sensitive to member's schedule, gets to know them, have one-to-one contact with all members to build relationships, inspire them to have a positive competition, using effective and suitable motivation methods to build trust.	Relationship building, Trust building, Personal communication
L9	Leaders relate to members at their own levels, appreciates their opinions and suggestions, care about their problems, expresses a personal interest in them, maintain a consistent trust, providing feedback.	Leaders soft skills, leadership Personal skills

Table 29 : Leadership Statement and sub-indicator

Evidence from Literature review:

Choosing these statements were totally based on the literature review, as we explain briefly in the following lines:

Zaccaro and Bader (2003) noted that today's organizational leader must deal with customers, stakeholders, and suppliers of the organization; and the exponential explosion in communication technology that has led to greater frequency of daily interactions with colleagues, coworkers, subordinates and bosses dispersed geographically. *(Statement L4)*

This new paradigm provides a range of new opportunities like the ability to instantly communicate one-on-one with employees, customers, and suppliers; *(Statement L6)* the capability to use talent wherever it exists; the opportunity to enhance organizational performance by assembling better multi-functional teams, and to improve better customer satisfaction by using the follow the sun methodology; the ability to cut costs; and, scope for better knowledge management *(Statement L1).* These can positively impact an organization's competitive advantage. However, V-leaders also have new challenges like how to bridge the physical distance from the followers; how to communicate effectively with far-flung team members; how to convey enthusiasm and inspire followers electronically; how to build trust with someone who may never see the leader; and so on. They need new skills for success. (Das gupta, 2011) *(Statement L9)*

In virtual organization, leaders are often the nexus of the team, facilitating communications, establishing processes, and taking responsibility for task completion (Duarte, Tennant-Snyder, 1999). *(Statement L5)*

Leaders in the virtual environments must learn to deal with greater logistical complexities, inter-company coordination, and must also account for significant country and cultural differences (Kramer, 2005). *(Statement L1)*

Although in traditional organization the project leader and manager have complementary roles, at least in theory, in VOs leader is responsible for the overall strategy, while the project manager in teams are responsible for operational management of the project. (Ran He, 2008)

Kramer published seven key competencies aimed at global leadership in his 2005 research:

- ✓ They must be open minded and flexible in thought.
- ✓ They should have an interest and sensitivity in new cultures.
- ✓ They must be able to deal with complexity and be prepared to make decisions that encompass multiple variables, considerable ambiguity, and evolving environments.
- ✓ They must be creative, positive, resilient, resourceful, optimistic, and energetic.
- ✓ They must maintain honesty and integrity. *(Statement L8)*
- ✓ They must have a stable personal life and, when applicable, a family that supports a global commitment to work.
- ✓ They must bring value added technical or business skills that lend credibility to their role (Kramer, 2005) *(Statement L9)*

Shachaf and Hara (Shachaf, 2005) suggest four dimensions of effective VO leadership:

- ✓ Communication: the leader provides continuous feedback, engages in regular and prompt communication, and clarifies tasks. *(Statement L5)*
- ✓ Understanding: the leader is sensitive to schedules of members, appreciates their opinions and suggestions, cares about member's problems, gets to know them, and expresses a personal interest in them. *(Statement L9)*
- ✓ Role clarity: the leader clearly defines responsibilities of all members, exercises authority, and mentors virtual team members. *(Statement L7)*
- ✓ Leadership attitude: the leader is assertive yet not too bossy, caring, relates to members at their own levels, and maintains a consistent attitude over the life of the project. *(Statement L7)*

Emergent leaders communicate more with other members (Misiolek & Heckman, 2005). However, it is not merely the sheer amount of communication that predicts leader emergence but rather the content and quality of the communications (Cassell, Huffaker, Tversky & Ferriman, 2006; Sarker, Grewel & Sarker, 2002). *(Statement L7)*

Having a creating Leadership skill has been emphasized by both Kramer and shachaf; in the other hand only Shachaf mentioned about the importance of role clarity for the staff. *(Statement L7)* Clearly task assignment is one of the other major roles of a V-leader. This task must be clearly described and assigned to prevent any conflict. Whenever a VO member log in, they get access to a restricted set of functionalities based on the role assigned to them by the VO leader. VO leader must predict and approve member's access level to the resources based in the process that assigned for the projects and tasks. *(Statement L3)* A VO leader is responsible for enrolling staff and resources into the VO. She/he also allocates members to the resources and views the overall resource usage of the VO. (Saleem, Krznari, Newhouse & Darlington, 2003) *(Statement L5)*

Keeping a close relation with staff has been emphasized by both Kramer and shachaf. The VO leader must have one-to-one contact with key members of VO. This is necessary for relationship building and maintenance and "bringing in" people over whom the leader had no authority, and then "making them stay". Leaders could not try to impose things on people. *(Statement L8)* They had to adopt different leadership styles and apply them as needed. Creating pleasant environment with a positive atmosphere, and talking about good results to make people feel appreciated is also so important. Accepting people's weaknesses is empathy, showing understanding of the other pressures and influences affecting them.

As the other role of a V-leader we can consider task management. *(Statement L5)*Oertig and Buergi in their 2006 research discussed that there are few steps that a VO leader on the team level must take to manage the task effectively.

7. Defining Team operating guidelines
8. Setting up a process that is simple and workable. *(Statement L5)*
9. Communicate that within the line. *(Statement L6)*
10. Being transparent about the invisible timetable and giving a bit of detail behind the scenes.
11. Checking people's written communication sent out, by doing follow-up, making phone calls or personal contact, as the geographical setting allowed.

12. Keeping everyone on the same level of information is something that had to be worked at, in particular if things are moving fast in one particular corner. (Oertig, Buergi, 2006)

Leaders' aggressiveness and assertiveness, for example, are directed by cultural norms (O'Hara-Davereaux & Johnsen, 1994). As a result, the VT leader must develop a style that will fit the cultural composition of its team members and optimize the cultural differences (Oakley, 1998; O'Hara-Davereaux & Johnsen, 1994) Lurey and Raisinghani (2001) suggest that leadership style is related to virtual team effectiveness only moderately. *(Statement L8)*

The VO literature suggests that knowledge workers are difficult to regulate and monitor using direct controls: "In the world of knowledge work, evaluating performance is ... difficult. How can a manager determine whether enough of a knowledge worker's brain cells are being devoted to a task?" (Davenport, 2005) And this is even more challenging when a manager wants to evaluate performance of a VO. *(Statement L1)*

Depickere (1999) argues that teleworking seems to have led to new forms of management, where Leaders seek to build a culture in which the worker independently performs tasks to the required level of quality and completeness. There has been a shift both from behavior control to empowerment and input control, and toward an increase in output control. *(Statement L8)*

A Leader can face these challenges and even turn them into opportunities. Leaders must coach members to move beyond their initial mindset of occasionally asking for advice or sharing ideas , to more of a formal project team mindset with the mission of developing best practices that, when implemented, will help the company's bottom line. *(Statement L2)* In most cases, v-leaders have very limited formal power and must rely on the intrinsic satisfaction their team will derive from seeing their innovative ideas in action. It is also imperative that location supervisors and managers give explicit permission for team members themselves to engage in VO activities.

As we can see in the table Communication is one of the biggest challenges in virtual teams. *(Statement L6)* One of the main challenges that emerged from the study was "providing clear direction and being able to effectively connect with virtual team members distributed across time zones" (Hanson, 2007).

To boost trust and cover this challenges there are five things a leader should do which suggested and represented by Hunsaker and Hunsaker (2008). These are:

6. Create face time,
7. Set goals and expectations, *(Statement L1)*
8. Provide ongoing feedback, *(Statement L2)*
9. Show-case team members‟ competence,
10. Foster cultural understandings. *(Statement L8)*

Through the process of work arrangements, Leaders seek increased flexibility, rapid innovation, customer responsiveness, less bureaucracy and improved collaboration (Jackson, 1999). Majchrzak et al. (2000 b) concludes that in the virtual team, the decision-making shifts from hierarchical in nature to more participative due to the adoption of technology. The leader's role becomes more ambiguous in the virtual team in that the leader is not the

information gatekeeper but rather a negotiator and facilitator. (Majchrzak et al., 2000 b) *(Statement L9)*

We also use many other bibliographical references from the existing literature to improve and set up the questions. For this part "Leadership" of the questionnaire, used references are listed in Appendix G-1.

Evidence from field experiment:

The importance of each leadership keywords and statements have been observed and examined in day to day execution of Tstab tasks. One of the most important one was the process of Hiring team members which has to happen over distance and then assign a specific role and task to that member, which was extremely challenging.

One of the other important points that we discovered during the experiencing T-Stab was the variety of media formats available and the decision of members to use one of them. These media were such as phones, email, instant messaging, virtual media, web conferences, and Skype. Researcher as the leader of Tsatb expected to have all the required skills to use these media among some of the other behaviors that the team expected the leader to be role model for them.

There was some evidence that members lose the sense of Fun to be in one place with other colleagues. They mentioned that they lost this chance while they are working for a virtual organization. In T-stab we felt a great need to create energetic and innovative situations in the virtual meetings to cover up this challenge.

Evidence from interviews and experts meeting:

Based on group meeting and interviews we found out that experts consider most of the employees who work from distance a virtual worker and according to their references, 35 percent of his organization's employees are dispersed. Most of them agreed that "It is almost impossible to work with only U.S.-based members in the company, and it is impossible to work only within your physical building."

In the group meeting one of the attendees mentioned that their primary challenge is using the global clock effectively and fairly; for large meeting with global members they needed to have it at 6 or 7 a.m. but as there was not enough evidence in the Literature for this point we just included this in the communication over time and space statement.

In interviews and group meeting members mentioned that Virtual Leaders did not get any specific training for this role so they have the same skill as the traditional organization leader like being authentic, connecting with others, promoting inclusiveness, networking, and all of the interpersonal skills that build relationships and trust building. As the results of each of them affects a wide range of international employees V-leaders need a defined ultimate strategy for tasks and using the skills along with actions for execution, as well as a way to measure results.

Last but not the least, in the interview, experts mentioned about the fact that being in the virtual world made it easier than ever for V-leaders to create the sense of connectedness. A

traditional leader can be present in one place and connect with employees but in the Virtual ICT framework the supervising process of tasks and feedbacks is just much more easy and effective.

2.2.7.2. Nine Teams statements in questionnaire:

Here we will analyze the 9 statements of "Team" dimension in Virtual organization excellence model questionnaire as listed in table below.

Id	Statement	Sub-indicator
T1	Having an interactive relationship between employees and leaders makes possible to have clear understanding of role, see that their opinions are taken into account when defining organizational objectives, and they are involved in decision making and setting goals collectively.	Team relation Opinion sharing
T2	A powerful reward system structure in which people are rewarded, recognized and cared for their achievements at work based on: meeting customer's and the organization's objective, skill-based criteria, learn the necessary new skills.	Reward system Achievement criteria
T3	Creating a special training (just-in-time learning) rules and motivations like: self managing skills, intercultural communication and meeting, trust building, project management skills, ICT framework training, language and balance between Technical and Interpersonal Skills, based on each position competences	Train & development, Skill training
T4	Creating stable trust that means internalization of VO norms and practices and willingness to cooperate, share, and give feed back to others despite of high turnover of VO members	Trust building
T5	Creating a united team spirit & belonging which prevents isolation and detachment with providing feedback to leader and other members about their performance using communication tools like text, chat, email and collaborative software systems, videoconferencing, preparing face-to-face meeting, voicemail messages.	Unity Isolation prevent feedback
T6	Create a unique VO culture beyond gender, age, ethnic background, personal tastes or preferences, language, theoretical framework, history, individual assumptions, values, biases, goals, styles.	Common culture Language barrier
T7	VO members must have ability to analyze, manage data, plan, and organize self work to correspond to team schedules, report progress and problems, monitor and control costs, take actions to get back on track, document and share learning.	Team working personal skills
T8	Having communication, awareness, and sensitivity between members despite cultural differences, understanding how cultural perspectives influence work and collaboration, and adjusting communication approach based on those differences, when appropriate.	Culture and collaboration
T9	Having self management skills like: ability to establish personal and professional priorities and goals, recognizing opportunities for individual learning and growth, taking the initiative to change working methods and processes, social adequacies. Being adaptable, plan-ahead, well organized, flexible, low levels of neuroticism, resilient, extroverted, self-confident, and open to new experiences highly self-motivated, developing plans to meet those goals, executing plans, multi-tasking, influential, strong sense of urgency and drive.	Self management skills Personal talents

Table 30: Teams Statement and sub-indicator

Evidence from Literature review:

Choosing these statements were totally based on the literature review, as we explain briefly in the following lines:

Today in virtual enterprises there is a new kind of team made up of people who communicate electronically. Members may hardly ever see each other in person, in fact, they may never meet at all, expect in cyberspace (Ale Ebrahim, et al, 2009). Gassmann and Von Zedtwitz (Gassmann, & Von Zedtwitz, 2003) defined "virtual team as a group of people and sub-teams who interact through interdependent tasks guided by common purpose and work across links strengthened by information, communication, and transport technologies". Another definition suggests that virtual teams are distributed work teams whose members are geographically dispersed and coordinate their work predominantly with electronic information and communication technologies like e-mail, video-conferencing, telephone, etc. (Hertel, Geister, Konradt, 2005). *(Statement T1)*

…These teams have fostered an extensive use of a variety of forms of computer-mediated communication that enable geographically dispersed members to coordinate their individual efforts and inputs (Peters, & Manz, 2007). *(Statement T1)*

In this thesis we accepted the most referred one which belongs to Ale Ebrahim and al in 2009. "Small temporary groups of geographically, organizationally and/or time dispersed knowledge workers who coordinate their work predominantly with electronic information and communication technologies in order to accomplish one or more organization tasks". (Ale Ebrahim, Ahmed, Taha, 2009). *(Statement T8)*

What these definitions have in common is that VTs are teams of people who primarily interact electronically and who may meet face-to-face occasionally. (Powell et al., 2004) *(Statement T8)*

In terms of human elements VTs are more complex than working face-to-face (Heimer & Vince, 1998). Site specific cultures and lack of familiarity are reported to be sources of conflict (Hinds & Bailey, 2003). Vakola and Wilson (2004) warn that the importance of the human element and the way that people co-operate with each other should not be taken for granted (Vakola & Wilson, 2004). *(Statement T8)* But the increased employment of virtual teams is in part due to readily available collaboration technologies, the increased use of alternative work arrangements (Gajendran & Harrison 2007) and the many potential benefits they can offer. These include stronger team-member participation (Townsend et al. 1998), reduced travel and collaboration costs, accelerated decision processes and increased sales (May & Carter 2001). *(Statement T5)*

Bordia (1997) and Lipnack & Stamps (2000) have found that group members within virtual teams tend to be more task-oriented because of the constraints imposed by computer mediated communication (CMC). In general, periodic face-to-face (FTF) meetings may improve project progress. *(Statement T5)*

There are too many challenges for Virtual teams because they exists trough computer mediated communication technology rather than face-to-face interaction (Gaudes et al., 2007). Sometimes they report to different supervisors and they function as empowered

professionals who are expected to use their initiative and resources to contribute to accomplishment of the team goal (Hunsaker & Hunsaker, 2008) *(Statement T5)*

Diversity in national background and culture is common in transnational and virtual teams (Staples & Zhao, 2006).In other hand in Virtual teams reliance on computer-mediated communication makes VTs unique from traditional ones (Munkvold & Zigurs, 2007). The processes used by successful virtual teams will be different from those used in face-to-face collaborations (FFCs) (Park & Hwang, 2003). *(Statement T8)*

In the Literature of Vo and VT there is a debate that the only way that VTs and TTs can be compared is to consider them to be a full Traditional or Full Virtual teams. Pawar and Sharifi (Pawar & Sharifi, 1997) studied real VTs in an organizational setting versus collocated team success and classified physical teams versus virtual teams in six categories based on their specific activity and table below summarizes these differences. *(Statement T8)*

Activity	Physical teams nature	Virtual teams nature
Cultural and educational background	members of the team are likely to have similar and complementary cultural and educational background	the team members varied in their education, culture, language, time orientation and expertise

Comparison between virtual and traditional teams has focused on the implication of virtual team's inability to meet face-to-face, and their reliance on electronic communication media (Powell et al., 2004). *(Statement T6)*
Second, companies can take advantage of the increased heterogeneity that is inherent in the nature of dispersed teams. Virtual teams tend to incorporate higher levels of structural and demographic diversity than collocate teams, and both types of diversity can be highly beneficial. (Cummings, 2004) *(Statement T7)*

… Besides this table, Dr.Davis Gould in 1997 suggested another perspective to look at the advantages of VTs:

- **Virtual teams get the job done**. Most of the teams achieved the goals set for them. In only one instance did a team fail to attain its goals, and this failure could not be connected to the fact that the team was a virtual team.

- **People can be trusted**. The question is the people you can't see can be trusted to do their work properly? The answer is clearly yes. *(Statement T4)*

    - ... Compared to Hackman's normative model (Hackman & Oldham, 1980), this framework is more holistic and emphasizes continuing dynamic process, disregarding chronological sequence. The components are reciprocal and interdependent among themselves:
    - …. **C:** In this part, several unique components of the internal environment in this framework described: IT use, Boundaries spanning, Team development, Conflict management, Communication, Norm Development, Trust, Commitment, Team

composition and design. These factors were recognized by other researchers to support VTE. Hackman & Oldham, 1980) *(Statement T4)*

….

…**Advantages**	**References**
Higher degree of cohesion (Teams can be organized whether or not members are in proximity to one another) *(Statement T5)*	Cascio, 2000 Kratzer, Leenders ,2005 Gaudes, et al. 2007
Producing better outcomes and attract better employees *(Statement T7)*	Martins, Gilson & Maynard, 2004 Rice et al. 2007
Sharing knowledge and experiences easily. *(Statement T1)*	Rosen, Furst & Blackburn, 2007 Zakaria, Amelinckx & Wilemon, 2004

Pitfalls	**References**
lack of physical interaction *(Statement T5)*	Cascio, 2000 Rice et al. 2007 Kankanhalli, Tan & Wei, 2006 Hossain & Wigand, 2004
Challenges of project management are more related to the distance between team members than to their cultural or language differences . *(Statement T8)*	Martinez-Sanchez, et al. 2006
Challenges of determining the appropriate task technology fit	Qureshi & Vogel, 2001 Ocker & Fjermestad, 2008
Cultural and functional diversity in virtual teams lead to differences in the members' thought processes. Develop trust among the members are challenging *(Statement T8)*	Kankanhalli, Tan & Wei, 2006 Poehler & Schumacher ,2007 Paul, et al, 2005
Create challenges and obstacles like technophobia (employees who are uncomfortable with computer and other telecommunications technologies) *(Statement T1)*	Johnson, Heimann & O'Neill, 2001
Variety of practices (cultural and work process diversity) and employee mobility negatively impacted performance in virtual teams. *(Statement T8)*	Chudoba, et al. ,2005
Team members need special training and encouragement. *(Statement T3)*	Ryssen & Godar, 2000

The virtual structure may not fit the operational environment: virtual teams may not be an appropriate tool for every company or organization. Joinson (2002) suggests that industries such as manufacturing may not be conducive to the use of virtual teams. He indicates that ''any type of work that's very sequential or integrated can pose problems for virtual teams.'' *(Statement T1)*

Lack of psychologically readiness to work entirely in a virtual space: thus, virtual teams are not always seen as ideal for many employees. According to Joinson (2002), some people who are stimulated by interaction with other people or who need external structure to stay on track may be unsuccessful in a virtual environment. These employees thus require extensive training and support if they are to be engaged, even partially, as a member of a virtual team. *(Statement T8)*

Ale Ebrahim, Ahmed, Taha, in their 2009 study demonstrated that there are 4 keys to have a successful virtual team as below:

- **Team selection**: Team selection is a key factor which differentiates successful teams from unsuccessful ones. The selection of partners greatly affects mutual trust, knowledge sharing, and performance (WI et al., 2008). Virtual teams can be designed to include the people most suited for a particular project (Bell & Kozlowski, 2002). Virtual team leaders rather than need to make sure the project is clearly defined, outcome priorities are established, and that a supportive team climate, need to select members with necessary skills (Hunsaker & Hunsaker, 2008). *(in L Statements)*

- **Reward structure:** The development of a fair and motivating reward system is another important issue at the beginning of virtual teamwork (Hertel, Geister & Konradt, 2005, Bal, & Teo, 2001). Virtual team performance must be recognized and rewarded (Bal & Gundry, 1999). Lurey and Raisinghani (Lurey & Raisinghani, 2001) in a survey in an effort to determine the factors that contribute to the success of a virtual team found that reward systems ranked strongly among the external support mechanisms for virtual teams. *(Statement T2)*

- **Meeting training:** Comparing teams with little and extensive training, Bal and Gundry (Bal & Teo, 2001) observed a significant drop in performance as both teams went live using the system. However, the latter then improved its performance at a faster rate than the former. Training is a key aspect that cannot be neglected in team building. Virtual team members require some different types of training to ordinary teams. The training includes self managing skills, communication and meeting training, project management skills, technology training, etc. (BAL & Gundry, 1999). *(Statement T3)*

…A violation of trust by any party will force the imposition of control mechanisms that make flexible and quick responses impossible (Handy, 1995), and the exile of the offender from the virtual web.

… Being aware of this advantages and pitfalls is one of the most important factors for Leaders, managers and staff of VO. Team managers should also be aware of such points in their teams to prevent any vulnerability, mistrust, managing conflict, and challenges of monitoring and control of activities. In 2 tables below you can find advantages and disadvantages of Virtual teams according to Ale Ebrahim, et al. in 2011. *(Statement T4)*

Cultural and functional diversity in virtual teams lead to differences in the members' thought processes. Develop trust among the members are challenging	Kankanhalli, Tan & Wei, 2006 Poehler & Schumacher ,2007 Paul, et al, 2005

Besides this table, Dr.Davis Gould in 1997 suggested another perspective to look at the advantages of VTs:

- People can be trusted. The question is the people you can't see can be trusted to do their work properly? The answer is clearly yes. *(Statement T4)*

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Team selection: Team selection is a key factor which differentiates successful teams from unsuccessful ones. The selection of partners greatly affects mutual trust, knowledge sharing, and performance (WI et al., 2008). Virtual teams can be designed to include the people most suited for a particular project (Bell & Kozlowski, 2002). *(in L Statements)*

Gould in his research (1997) suggested some tips on alleviating communication problems:

- ✓ Develop trust. Charles Handy, an author and management consultant, addresses this issue quite clearly. "If we are to enjoy the efficiencies and other benefits of the virtual organization, we will have to rediscover how to run organizations based more on trust than on control. Virtuality requires trust to make it work: Technology on its own is not enough (Gould, 1997). *(Statement T4)*

… The majority of discussions of team trust has tended to deal with how trust between team members affect cooperation (Politis, 2003) and performance (Costa, 2003; Erdem & Ozen, 2003) of conventional teams; *(Statement T4)*

Webster and Wong in their 2008 research discussed that group identity represents team members' sense of oneness with the group, and is made up of a cognitive component of belonging, an affective component of emotional attraction, and a behavioral component of joint effort toward a common goal. Those who identify more with their workgroups tend to perform better (Vogel, Davison and Shroff, 2001) and to perceive higher trust, cooperation, confidence and personal satisfaction (Fiol and O'Connor 2002). *(Statement T4)*

We also use many other bibliographical references from the existing literature to improve and set up the questions. For this part "Virtual Teams" of the questionnaire, used references are listed in Appendix G-2.

Evidence from field experiment:

Building a virtual team and managing it was the main reason why we tried to conduct a field experiment. The first thing that we experienced was the difficulty of planning and managing workforce which is out of sight and could not be supervised directly. As manager we needed to create and maintain a strong trust between team members and they on the other hand had to trust each other in team. As a person who must have a big picture and arrange team members to achieve the project goal this issue was challenging from the first moment.

Also as manager of virtual team we had this role to help each member to be ensured of clarity of their role and as part of the V-leader role, we should focus on consistency of content, detail, timing and tone of communicating in the ICT framework.

The variety of roles that a manager must do could create confusion and was one of the biggest challenges of the T-stab. For example there were a big risk of communication content and the media they have been sent using it. Some of the members were not used to utilize video conferencing software and still was much more comfortable using text chat

software. So the reality was that the V-manager could be the person who creates this unique software utilization culture inside the VO, that itself is a big challenge.

As in Tstab we must keep the cost on the lowest possible level to be agile and fast in our R&D process, we decided to choose the best ICT framework to communicate and file share. We had plenty of free chose, For example Basecamp makes it easy to keep schedules in check, offering ways for entire team to view and update projects and plan out what needs to get accomplished next.

Trello, could be used in conjunction with Basecamp, a team member from anywhere can see what's already been done and what is "on deck" to get tackled next. We could have used P2 or iDone for regular updates, P2 was good if we prefer a simple daily email or set up iDone that is to get a daily digest of what team did that day.

For file sharing Dropbox was a no-brainer at this point; Dropbox could eliminate the worry of not having access to a particular file because it's only on one person's hard drive. Skype, Google+ hangouts, was some sort of software that is regularly used for video chats.

Evidence from interviews and experts meeting:

Based on group meeting and interviews we found out that managers of virtual teams need to consider a number of logistical and substantive work quality issues to ensure a smoothly functioning team. Managers are the one who should figure out the future of the VO and teams in the long run. They must be professional in the using of ICT framework and be the most knowledgeable to answer the questions and give feedback.

One of the interesting points that we faced during the interviews was when we spoke with EFQM assessors working in a traditional organization. They believed that communication and collaboration can be more difficult when employees do not sit in the same room and talk to each other face to face with some regularity. It can also be more difficult to monitor productivity, work habits and quality. So they believed that it is a big challenge to find whatever tools the company need to improve communication with a virtual workforce, such as video conferencing and online meeting applications.

On the other hand VO experts put some stress on the context of the communication. They said any inappropriate comments sent by e-mail or text can be preserved for a very long time. They noted that because e-mails don't come with facial expressions or tone of voice, the recipient of a 'joke,' may not perceive the joking manner in which a comment is made. So the trust and common culture in a VO is so important.

And although in a VO there is a very small chance of face to face meeting, we must make sure that members talk to each other by phone or meet trough video conferencing to convey that same feeling. E-mails are permanent, this can be both good and bad because members are getting used to this media and would show resilience in using other formats.

2.2.7.3. Six Knowledge statements in questionnaire:

Here we will analyze the 6 statements of "Knowledge" dimension in Virtual organization excellence model questionnaire as listed in table below.

Id	Statement	Sub-indicator
K1	Identify and input data from projects, communications, environment, staff experience, feedback, share recourses (like calendars), teams, customers, suppliers, competitors, standards, lessons learned, benchmarking, suggestions, innovations , scientific documents, ...	Identify data Data input
K3	All members are part of creating knowledge; They use recent data and reflect the results after finalizing the projects. These new data get identified and categorized for future improvement	Data ecosystem
K5	Enrich data and knowledge by making it a must to use and share data by any individual or group	Data use and share culture
K6	Creating a transparent VO which each member can "see" and "feel" what is happening above and around.	Transparency in knowledge cycle
K4	Assign each VO member a level or permission that shows who can access what in knowledge database.	Knowledge access
K2	Data categorization are reviewed to prevent any redundancy and share openly via all channels inside VO.	Data categorization Redundancy prevent

Table 31 : Knowledge Statement and sub-indicator

Evidence from Literature review:

Choosing these statements were totally based on the literature review, as we explain briefly in the following lines:

- ✓ …Besides this models Venkatraman and Henderson (1998) model suggested an architecture for the VO along the three vectors of customer interaction, knowledge leverage and asset configuration, along which it needs to progress. *(Statement K5)*

- *The knowledge leverage vector (virtual expertise)* is concerned with the opportunities for leveraging diverse sources of expertise within and across organizational boundaries. IT now enables knowledge and expertise to become drivers of value creation and organizational effectiveness. *(Statement K5)*

… Virtuality as a strategic approach is singularly focused on creating, nurturing, and deploying key intellectual and knowledge assets while sourcing tangible, physical assets in a complex network of relationships. *(Statement K1)*

… Kaboli et al in their 2006 research made a table for Virtual Organization Types Comparison on Multiple Dimensions as below: *(Statement K5)*

	Virtual Teams	Virtual Projects	Temporary VO	Permanent VO
Uses of IT	Connectivity sharing embedded knowledge (email groupware)	Repository of shared data (databases, groupware)	Shared infrastructure (groupware, WANs, remote computing)	Channel for marketing and distribution, replacing physical infrastructure(web, Intranet)

… Work teams are most useful where job content changes frequently and employees with limited skills and a specific set of duties are unable to cope. Nowadays many organizations have shifted from hierarchical structures to more flexible ones, thus empowering lower level employees and allowing better utilization of distributed knowledge resources (Cooney 2004). *(Statement K6)*

… Tong & Yang in their 2013 research compared VTs with conventional teams (TT) at different stages of a team's lifecycle (Table below) *(Statement K3)*

Stage	Characteristics	Unique Features of VTs	Unique Features of conventional teams
Team initiation and formation	Objective	Focus more on fulfilling employees' personal interests regarding grassroots issues	Focus more on managing assigned tasks
	Nature of task	Often beyond basic work duties, on an ad hoc basis, of short duration, or facing demanding deadlines	Often within routine work duties
	Member search	Apply additional online tools, such as social networks or online communities	Based on manager's knowledge
	Member selection criteria	In addition to seeking members with professional capabilities and team spirit, selection is based on members' interests, responsibility, and communication skills	Professional capabilities and team spirit

… In 2 tables below you can find advantages and disadvantages of Virtual teams according to Ale Ebrahim, et al. in 2011. *(Statement K5)*

Advantages	References
Sharing knowledge and experiences easily	Rosen, Furst & Blackburn, 2007 Zakaria, Amelinckx & Wilemon, 2004

... Team selection is a key factor which differentiates successful teams from unsuccessful ones. The selection of partners greatly affects mutual trust, knowledge sharing, and performance (WI et al., 2008) *(Statement K5)*

… Different lifecycle stages mentioned in the picture are so clear but the process of team formation has three key challenges (Tong & Yang, 2013)

3rd stage… There is some evidence that some VOs preferred potential members to be located within the same time zone. To mitigate this concern, organizational management should provide support to internal and external team members for complementary use of various asynchronous communication technologies (e.g., emails, discussion boards, or knowledge sharing databases) as well as synchronous media (e.g., instant messaging, video conferencing, or telephone calls). *(Statement K1 & K3 & K5)*

… This new paradigm provides a range of new opportunities like the ability to instantly communicate one-on-one with employees… the ability to cut costs; and, scope for better knowledge management. These can positively impact an organization's competitive advantage. (Das gupta, 2011) *(Statement K3 & K4)*

… Any member with relevant knowledge and experience can share and lead a specific project and people may work in multiple teams simultaneously, as leader in one and as member on another (Shamir, 1999; Den Hartog, 2004). *(Statement K5)*

…. Cordery at al. (2009) demonstrated the challenges that leaders face in attempting to ensure their long-term effectiveness. A summary of the leadership challenges and leader responses is shown in Table below.

VO challenges	Leader Responses
Building and sustaining relationships	Create a climate of ''psychological safety'' wherein members are confident that their inputs are welcome and appreciated Be aware of national diversity and cultural sensitivities when facilitating discussions at meetings Communicate the rewards of knowledge sharing to break down reticence from culturally diverse members. *(Statement K3)*
Stabilizing the membership	Continually work to integrate new m embers into the group, both on an interpersonal level and also in terms of becoming aware of their knowledge and expertise. *(Statement K1)*
Demonstrating worth	Get external sponsorship Get commitment from managers at the various locations to try ideas the GVTs had initiated Actively facilitate the transfer of GVT knowledge and solutions to the relevant parts of the organization (i.e., potential customers) *(Statement K4)*

… Sometimes, members themselves may be a problem in communication process. Information sharing is one of the vital elements of any team. However, some members refuse information and knowledge sharing among team. In this situation, leader must call members to collaboration with together till creates harmony and consensus sensation. One of the main challenges that emerged from the study was "providing clear direction and being able to effectively connect with virtual team members distributed across time zones" (Hanson, 2007). *(Statement K5)*

… Suomi and Pekkola (1999) distinguish between three forms of leadership or management rationality that is applied to virtual work:

- ✓ Strategic (which is assessed in terms of revenue),
- ✓ Economic (which is to improve products or services)
- ✓ Resource-based (which is directed at exploiting the knowledge of staff to the greatest extent). *(Statement K3)*

… The focus of the social action framework for analyzing groupware (Ngwenyama & Lyytinen, 1997) is the use of IT for communication and creation/use of knowledge among VO members. *(Statement K3 &K5)*

… Oertig and Buergi in 2006 found out that primarily there is a link between being able to trust people's expertise, their developing knowledge of the company and knowledge of the task. *(Statement K3)*

... As a product of power relations, knowledge comprises information, communication, human resources, intellectual capital, brands, etc. (Quintas et al 1997) During the past decade, knowledge capital of a company has been widely acknowledged as a pivotal resource for organizations and undoubtedly, it should be judiciously managed. *(Statement K1 &K3)*

… There is another important concept that helps VO's effectiveness that is Knowledge management in virtual organization. The concept of KM is not new in information systems practice and research. It is defined as "a process that deals with the development, storage, retrieval, and dissemination of information and expertise within an organization to support and improve its business performance" (Gupta et al 2000). *(Statement K3)*

The current business environment characterized by radical and accelerating changes has unfolded the limitation of traditional organization to implement complete view of KM. Specifically; KM has been suffering from the traditional organizational control model. The documents as well as the acquired knowledge get lost due to the lack of effective organizational KM; even worse, some documents are accidentally deleted from the resource pool without any awareness or consciousness. *(Statement K3)*

As the remedy, a faster cycle of knowledge creation and action should be necessarily implemented (Denison & Mishra 1995). Additionally, KM strategy should be altered and aimed at understanding the presence of knowledge communities and the various channels of knowledge sharing within and between them, and applying ICT appropriately (Malhotra, 2000). *(Statement K3)*

… To go back to the big picture of the effectiveness, Ale Ebrahim et al. in his 2009 research suggested factors to measure VO effectiveness as below. Although most of the factors focus of Virtual teams but the approach is to increase the whole VO effectiveness:

- ✓ **Alignment:** Alignment is the degree to which the interests and actions of each employee support the clearly stated and communicated key goals of the organization. However, the key elements in knowledge sharing are not only the hardware and software, but also the ability and willingness of team members to actively participate in the knowledge sharing process (Rosen, Furst, Blackburn, 2007). *(Statement K5)*

…Resources pooling and knowledge sharing: Participants within a VO complement each other by pooling, sharing, and reallocating the resources since they have realized their strong dependence on one another and the continued participation in the network also necessitates this sharing. *(Statement K3 & K5)*

We also use many other bibliographical references from the existing literature to improve and set up the questions. For this part "Knowledge" of the questionnaire, used references are listed in Appendix G-3.

Evidence from field experiment:

In Tstab we mostly experienced the Research and development process and the most important factor that we had was to exchange was Knowledge. Since we had less information about each other and could not meet other members so this knowledge exchange was the most important way that we communicate through it.

Other experience was when we wanted to reduce the sense of isolation between team members; this Knowledge sharing helped us to achieve this goal. Also in the culture we emphasized on the Knowledge management that made learning process and experience sharing possible.

We tried not to push anybody to create and exchange knowledge. We used Knowledge based strategies that were not centered on collecting and disseminating information and rather on creating a mechanism for practitioners to reach out and communicate to other practitioners was in our plan in Tstab.

As Tstab was a new and small organization our goal was to find ways that support the transformation of individuals' personal knowledge into organizational knowledge. That goal required designing environments where all the individuals feel comfortable (and have incentives) to share what they know. It was important that this activity not feel like a burdensome "overhead" task, which is why doing it in the process of what feels like informal conversation works well. So we tried to use some of the technologies that make face to face meetings possible to transfer the not written knowledge shared.

Evidence from interviews and experts meeting:

Based on group meeting and interviews we found out that Knowledge sharing among VT members is one of the most important factors in efficiency of Virtual organization. In VO knowledge is integrated in the life of teams and needs to be made explicit and it's important to create ways for team members to experience this knowledge sharing. Apart from member's own knowledge there is other format of knowledge that depends on engagement in practice. These are kind of knowledge that people gain from observation and participation in the process of a project.

Knowledge sharing is also one of the biggest parts of communication in a virtual organization. For instance, synchronous communication, (i.e. audio or video-conferencing) should be utilized when engaging in knowledge-sharing or relational tasks, such as brainstorming, decision-making, or handling interpersonal conflicts.

Other points were about Leader's role in hiring teams with diversity of Knowledge .This strategy in hiring increases sensitivity to and awareness of the diversities in the workforce. Also open communication with others about cultural differences create more knowledge about members in the system.

In an interview, a Virtual organization expert emphasized on the relationship between information sharing and team performance. Research results showed that those teams that shared more Knowledge experienced levels of increased performance compared to those who shared less. Also there was an emphasized on the necessity of putting Knowledge in the Virtual organization excellence model as any kind of process in sharing knowledge among virtual team members increases overall performance. Because mutual knowledge has the potential to positively affect virtual team inputs, socio-emotional processes, task processes, and outputs.

2.2.7.4. Nine ICT statements in questionnaire:

Here we will analyze the 9 statements of "ICT framework" dimension in Virtual organization excellence model questionnaire as listed in table below.

Id	Statement	Sub-indicator
I1	Having an ICT framework providing: email, Instant Messaging, groupware/Shared Services ,web conferencing, remote access, file transfer, report generating, teleconferencing ,voice- data conversations at the same time and well graphically designed to be user-friendly like a "Real" physical space	360 degree Communication tools, virtuality
I2	Managing, maintaining and developing the ICTF periodically (have access to 24/7 support)	24/7 support maintenance
I3	ICTF having cloud computing ability as SaaS (Software as a service), PaaS (Platform as a service) or IaaS (Infrastructure as a service) to decrease system errors and threats such as hardware damage, supply failure, fire, flood, etc compared to in-house server	Cloud based framework, Hazard prevent
I4	Providing each VO member a clear identity and access level in ICTF while all actions in the system are recordable and traceable.	Individual access level
I5	Availability of dashboard of results (financial, recourses, etc) for leader's decision making based on all input data.	Leader dashboard
I6	To increase quality of virtual working ICTF need to be Technology-Task-Structure fit.	Task-Technology fit
I7	Enabling VO to get to its goal in most efficient way using less recourse in ICTF.	Efficiency Enabling
I8	Providing members with the flexibility in where and when work is performed and reported trough (text, voice, and video) in ICTF.	Flexible workplace
I9	ICTF provides VO a high level data, information, and knowledge security in three technical, organizational, and legal dimensions.	Security

Table 32: ICT Statement and sub-indicator

Evidence from Literature review:

Choosing these statements were totally based on the literature review, as we explain briefly in the following lines:

…. Advances in technology facilitate communication and the sharing of information among team members. *(Statement I1)* But, with members in multiple time zones, logistics are more complex. *(Statement I3)* As a result, building trust among team members and overcoming feelings of isolation and detachment becomes a challenge. Thus ICT use in global organizations increases teamwork complexity and may impact its effectiveness. (Jarvenpaa, Leidner, 1999) *(Statement I7)*

Researchers have identified differences in technology use and perception of task technology fit between eastern and western cultures. *(Statement I6)* Lee (Lee, 2002) found that patterns of e-mail use vary (probably due to power distance). Massey et al. (Massey, Hung, Montoya-Weiss, Ramesh, 2001) found significant differences in the perception of task technology fit between virtual team members from the United States, Asia, and Europe. On the other hand, no significant influence of cultural diversity on trust was found in virtual teams (Jarvenpaa, Leidner, 1999) *(Statement I6)*

…Chidambaram and Kautz focused on the extent to which electronic meeting systems help define common ground; they found that some electronic meeting system structures affected diversity reducing or increasing its impact. For example, the anonymity feature strongly reduced negative aspects of diversity, such as stereotyping, while strongly increasing participation and the meeting quality. (Chidambaram, Kautz, 1993; Anderson, 2000). *(Statement I1)*

The simultaneity feature decreased distortion in communication and collusion; it strongly increased the number of alternatives, the quality of the process and the decision. The electronic recording and display feature strongly decreased distorted communication; decreased collusion; increased cohesiveness, inclusion, and common ground; and eventually increased the quality of the process and decision. *(Statement I1)*

Finally, the process-structuring feature strongly increased conflict management, so that process quality increased. Daily et al. (Daily, Whatley, Ash, Steiner, 1996) found that groups that used group decision support systems (GDSS) outperformed those that did not. *(Statement I5)*

… Deploying remote offices is usually done in a partnership between the employee who will work in the remote office and the company's ICT framework and facilities organizations. *(Statement I8)* Providing technical support to remote workers also is a key concern to organizations adopting alternative work arrangements. Offering 24 hour a day support, seven days a week can become expensive (Becker & Steele, 1995). *(Statement I2)* And this is the exact place that a good ICT framework can become handy.

…Vo is a clear model of successfully replacing offices with technology; portable computers, cellular phones, and fax machines all enable remote or mobile work. *(Statement I8)*

…Information technology (IT) improves NPD (new product development) team's flexibility (Durmusoglu & Calantone, 2006). The internet facilitates and improves collaborations and thus increases the performance of new products (Ozer, M., 2004). *(Statement I7)* Furthermore, Ozer (Ozer, M., 2000) concludes that IT undoubtedly has the potentials to significantly improve the new product development activities of industrial companies. The use of virtual teams for new product development is rapidly growing and organizations can be dependent on it to sustain competitive advantage (Taifi, 2007). *(Statement I7)*

Now it is important to know how ICT framework can help VOs in the process of innovation. The Small and Medium sized VOs are one of the sectors that have a strong potential to benefit from advances in Information and Communication Technologies (ICTs) and the adaptation of new business modes of operation (Miles, Snow & Miles, 2000). The use of ICTs can be considered as key factors for innovation and entrepreneurship. ICTs are a must for VOs to innovate (Redoli, et al., 2008).

Simple transmission of information from point A to point B is not enough; the virtual environment presents significant challenges to effective communication (Walvoord et al., 2008). Being equipped with even the most advanced technologies is not adequate to make a

virtual organization effective, since the internal group dynamics and external support mechanisms must also be present for a team to succeed in the virtual world (Lurey & Raisinghani, 2001). *(Statement I1)*

Enterprise solutions by leading ERP vendors like SAP and Oracle have their IT solutions covering these three directions. SAP models its solutions around customers, vendors and employees (SAP, 2004). Oracle's "unified workplace" provides an integrated architecture to interconnect all the stakeholders of the organization. Specifically this allows employees, customers and partners to collaborate. (Oracle Corporation, 2004; shekhar, 2006) *(Statement I3)*

According to what was said in this section the technology that the VO uses to achieve its tasks should support team social actions. The focus of the social action framework for analyzing groupware (Ngwenyama & Lyytinen, 1997) is the use of IT for communication and creation/use of knowledge among VO members. *(Statement I1)*

All said in this section and many other researches that we did not have opportunity to discus about them here, creates an ambiguous image of a "Fit" ICT framework for VOs. Here we will show Strader et al.'s VO ICT infrastructure as figure below (Strader et al. 1998). Here we can see the relationship between the specified components of this information infrastructure that accounts for each of the specifications, and the relationship between the specifications in a VO and will enable effective virtual organization management. *(Statement I1 & I4)*

….The concept of security and its necessity is inseparable from network-based information systems or as we mentioned above ICT framework. It has a particular significance for virtual organizations whose activities either strongly or entirely depend on the network access. The safety level of the VO member organizations and their communication influences security of the entire virtual organization. *(Statement I9 & I4)*

…The security framework is a set of methods, tools and guidelines that a VO is expected to deploy in order to protect its resources, e.g. data being processed, information on the organization and its users (system configuration, passwords, etc.), services offered, as well as, the whole infrastructure with its components (computers, network elements, wiring, etc.). An additional requirement is to assure the possibility to efficiently manage elements of the security framework. This includes: design, deployment and execution of the VO own security strategy. (Magiera & Pawlak, 2005) *(Statement I9)*

However, the concept of virtual organizations does introduce its own set of security challenges, as users and resource providers can come from mutually distributed administrative domains and some participants can behave maliciously. *(Statement I9)* These malicious attacks can generally compromise the resource provider node and the shared resources node may be malicious or compromised to harm the user's job running on the supporting platform. (Yates & Orlikowski, 2003) *(Statement I1& I3)*

…What kind of threats can be a serious danger for VO security and productivity? There are different sources and types of potential threats to VOs security. *(Statement I9)*

- Threats caused by an activity aimed at altering the present state of a system. What we mean is any attempt to break the protection in order to illegally use resources, any interference in the processed data, resulting in the data loss. *(Statement I9)*

The first two groups assume the purposeful action aimed at unauthorized access to protected resources and their alteration. A number of techniques are being employed these days to break the protection system (Lockhart, 2004; Peikari & Chuvakin, 2004). *(Statement I4)*

We also use many other bibliographical references from the existing literature to improve and set up the questions. For this part "ICT framework" of the questionnaire, used references is listed in Appendix G-4.

Evidence from field experiment:

Choosing the most suitable ICT framework for Tstab was one of the challenges that we faced in this experiment. As we said in the last sections we finally decided to go on with ASANA and start our communication based on this tool. Leader of the Tstab must create the projects and tasks and team members could came and discuss about it and follow up (C. Appendix). Although we chose Asana as our main cooperation center but some of the members were still comfortable to use Google talk and hangout and Skype beside this tool.

After couple of week in a virtual meeting we raised the concept of evaluation our main ICT framework. In the discussion it was interesting that 80 percent of team members said their ability to communicate and collaborate with others was the same as, if not better than, it was when working in the same place and it was mostly because the task -technology fit ICT framework that we were using for internal communication.

Also in the team formation step we asked potential members about their skills regarding using this kind of frameworks. We witnessed those members from Iran and UAE had less knowledge and experience using these software comparing potential members from USA.

Evidence from interview and experts meeting:

Based on group meeting and interviews we found out that choosing the appropriate ICT framework for a Virtual organization is so important even more than the number of studies that we found in the literature review. This framework gives the firm ability to monitor member's actions and control the workflow. A VO manager must have the access to a kind of dashboard (admin board) to stop worrying about how they trust team members. If managers continually worrying what someone is doing, then they are spending brain cycles focusing on something other than the product and that would seriously reduce the productivity of a virtual organization.

We also interviewed a manager from a company who they had a small group work as the main organization in a physical place and the rest of the team were people who worked remotely. The problem was mostly the traditional workers to keep up with the cycle of work

in the virtual part of the company. More investigation showed that they were not as skilled in using the software as other virtual team members.

Other expert from a fully Virtual organization emphasized on finding a way to meet in person despite of ICT framework abilities is so important. This manager also emphasized on the importance of having skills to use other online collaboration platform like Dropbox and Google Docs. These tools allow working together on a document at the same time, sharing the same resources and keeping track of what the rest of the team is doing in real time.

2.2.7.5. Eight Process statements in questionnaire:

Here we will analyze the 8 statements of "Process" dimension in Virtual organization excellence model questionnaire as listed in table below.

Id	Statement	Sub-indicator
P1	Processes designed and get managed in order to create best usage of resources, reduce staff time and costs, distribute information and knowledge, cope with location and time zone barriers, reducing and optimizing physical, economic and financial resources, find out employee opinions, and represent flatness and agility and create high degree of cohesion in VO.	Resource management, Time reduction, Cost reduction, Cohesion creation
P2	Comprehensive documentation of work methods and organizational processes in all angels.	Process documentation
P3	There are open and transparent formal communication procedures within staff, customers, and suppliers	Transparent process
P4	Processes are being improved as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders.	Process reviewing, Process innovation
P5	Processes are fitting Task-Technology-Structure concept of VO.	Task- technology fit process
P6	Deploying policy and strategy through processes to make sure every member works toward VO's mission and objectives.	Process fulfill strategy
P7	Customers, partners, suppliers play an important roles in VO process at different stage.	Stakeholders needs fit process
P8	Placing a systems of indicators to detect changes necessity in processes	Process reviewing necessity detect

Table 33: Process Statement and sub-indicator

Evidence from Literature review:

Choosing these statements were totally based on the literature review, as we explain briefly in the following lines:

…The basic objective of a VO in the current globalized context would be to enable business processes or activities to be performed using geographically dispersed resources across one or more organizations for increasing competitiveness. Given this overarching definition of a VO, we now proceed to understand how we can accommodate various manifestations of a VO in a common conceptual framework, based on which we can proceed to understand virtuality as a measurable construct that can be used across multiple organizational contexts (Shekhar, 2006). *(Statement P1)*

- Travica in his research in 2005 created a clear model called ISSAAC (read as "Isaac") that accounts both for degree of virtuality and for the VO characteristics…. *Anchoring*: refers to the support that Cybernization meets in the management, structural, process, cultural, political, and strategic aspects of an organization. Existing in the cyber space through information systems and networks needs to be anchored in the organization of work, management methods, organizational values, etc. *(Statement P1)*

…Venkatraman and Henderson (1998) also emphasized that each vector has three distinct stages: Stage one focuses on the task units (such as customer service, purchasing, or new product development).Stage two focuses at the organizational level on how to coordinate process activities to create superior economic value. *(Statement P1)*

…Travica (2005) also summarizes some of the characteristics of a VO as Table 1:

…VO Characteristic	**Description**
2. Virtualness is a property of organization	Virtualness of processes is a matter of scale and it can occur on the front/back end of an organization, and in the production core. *(Statement P1 & P2 & P3)* In this respect, VO is tangible.
3. Multiplication Effect	The same organization can be involved in different VOs simultaneously (processes virtualized on the back end and in the production core can create different VOs). *(Statement P1 & P2 & P3)*
7. IT is a necessary but not sufficient condition	- IT is used for electronic networking and in various processes as an enabler complementing social conditions. - This characteristic differentiates between VO and the network organization. *(Statement P7)*

… Kaboli et al., 2006, explained that VOs got different characteristic based on the scope of the work, the projected length of time spent in virtual work, types of projects, the range of involvement and the number of personnel involved.

- ✓ **Virtual teams:** Internal organizational use of the virtual concept has generated virtual teams in a variety of organizations. In most cases these teams come from a specific functional, process or strategic business unit within a larger organization. The organizational use of the virtual concept in this instance is in virtual tasks and virtual teams. *(Statement P1)*

... Vakola and Wilson (2004) warn that the importance of the human element and the way that people co-operate with each other should not be taken for granted (Vakola & Wilson, 2004). But the increased employment of virtual teams is in part due to readily available collaboration technologies, the increased use of alternative work arrangements (Gajendran & Harrison 2007) and the many potential benefits they can offer. These include stronger team-member participation (Townsend et al. 1998), reduced travel and collaboration costs, accelerated decision processes and increased sales (May & Carter 2001). *(Statement P1)*

... An analysis of each function cost is then carried out. At this stage the product technologies and design are selected. The processes necessary to develop the product and their costs are then deduced. In the last step of this pre-study, the processes of a same type can be regrouped or reorganized according to manufacturing activities or manufacturing businesses. Successive

process decomposition is sometimes needed to determine a set of tasks in which every task can be assigned entirely to a single VT. *(Statement P2)*To be efficient, this process is not homogeneous. A task assignable to a responsible firm is no longer decomposed(Martinez, Fouletier, park, 2001).

….Rezgui, (Rezgui,2007) mentioned that virtual teams research to date has not questioned the applicability of traditional team process views to the virtual environment, and has provided little formalization of working procedures and managerial structures. *(Statement P2)*

... Beside these two, Durate and Snyder in their book (Duarte & Snyder, 1995) categorized virtual teams in terms of many different configurations:

- *Parallel teams* are becoming a fairly common way for multinational and global organizations to make recommendations about worldwide process and systems that take into account a global perspective. Also, Work in short term to develop recommendations for an Improvement in a process or system; has a distinct membership. *(Statement P4 &P8)*

In 2 tables below you can find advantages and disadvantages of Virtual teams according to Ale Ebrahim, et al. in 2011.

Pitfalls	References
everything to be reinforced in a much more structured, formal process .*(Statement P2)*	Lurey & Raisinghani, 2001
Cultural and functional diversity in virtual teams lead to differences in the members' thought processes. Develop trust among the members are challenging. *(Statement P3)*	Kankanhalli, Tan & Wei, 2006 Poehler & Schumacher ,2007 Paul, et al, 2005

… As the team matures, processes are put into place and the team becomes more efficient (Gould, D., 1997). *(Statement P6)*

… Gibson and Cohen's (2006) research somehow summarized these several challenges that occur in virtual teams into Technology Failures, Communication Mishaps, Dysfunctional Conflict, Inefficient Work Processes, and Challenges to Support Systems. *(Statement P1)*

…A survey, involved a questionnaire based on a framework for virtual team effectiveness developed by Lurey and Raisinghani (2001). The framework includes three main factors that are expected to have a direct effect on team effectiveness. These factors are:

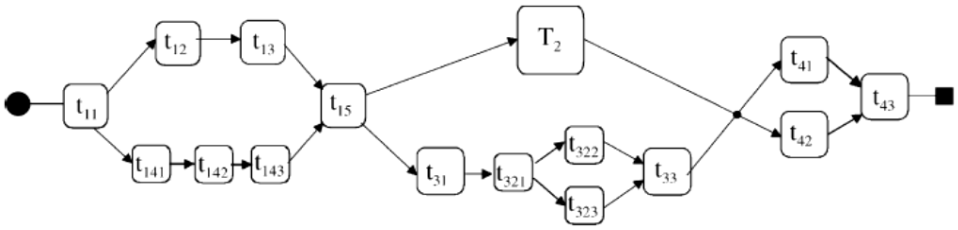
- Internal group dynamics (job characteristics, selection procedure, team member relations, team process, internal team leadership); *(Statement P1)*
- External support mechanisms (education system, reward system; executive leadership style, tools and technologies, communication patterns);
- Design process. *(All P Statement)*

We also use many other bibliographical references from the existing literature to improve and set up the questions. For this part "Process" of the questionnaire, used references is listed in Appendix G-5.

Evidence from field experiment:

Everything inside VO needs to be connected with ICT, but how? This is the main question that designing the process can answer them. In other words process connects HR to other recourses via ICT framework. Designing process in Virtual organization is a big challenge because all the connection happen trough this process and any wrong design would affect the productivity directly!

From the very first moment we decided to design process involving team in this task. Team members felt that they are only designing the process for transferring knowledge inside Tstab. So we started by decomposition big tasks into couple of small tasks that needs to be done by different VTs.



First we chose to analyze the process of R&D and decomposed according to its functions just like the Figure below which we discussed in chapter 1. Then we build a matrix of Tstab's HR and created teams according to the task we founded. In the last step the processes of a same type have been assigned to one team. We also felt that successive process decomposition is sometimes needed to determine a set of tasks in which every task can be assigned entirely to a single VT.

We tried to design basic business process based on other VO's experiences but as we has very small team there was not such a complexity there. Beside this Tstab faced challenges in designing a process or algorithm for the main service . One of the most important objective of Tstab was to build an application to stabilizing training matial in mind, so we needed to have a specific algorithm to achieve our goal (like lietner box).

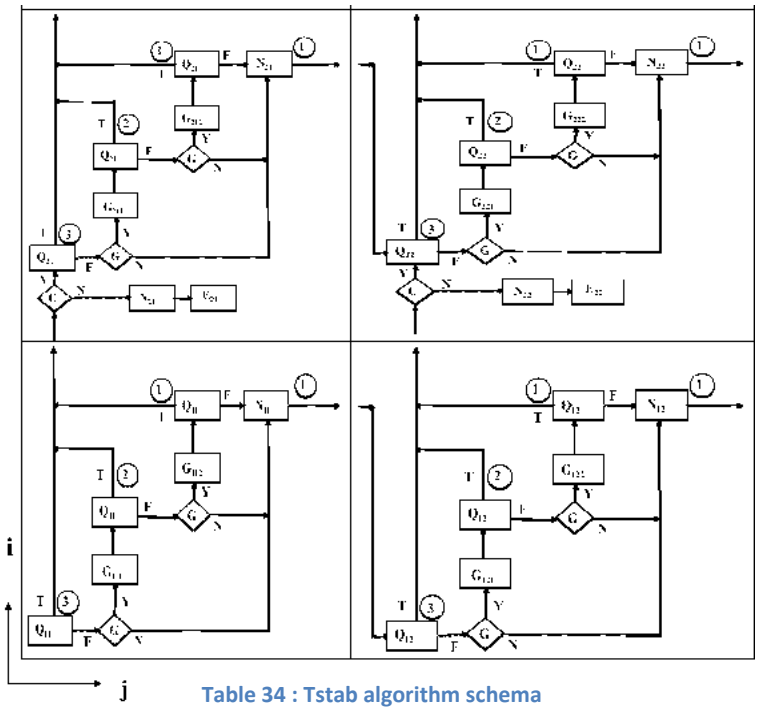


Table 34 : Tstab algorithm schema

Figure in the right, shows the algorithm that we came up with in Tstab. This figure contains 4 blocks, the process starts from the bottom-left box. 10 days after any training in any subject, this application will send the first note, picture or question to the user. If user answered correctly algorithm will move to the top box (level 2). If not

application would continue (right box, same level) sending more notes and questions to remind user of that topic, and this process will be continued.

Evidence from interviews and experts meeting:

Based on group meeting and interviews we found out that managers are increasingly being asked to prioritize where they can best utilize their time, talents, and resources, and where they can find places to cut. They increasingly try to design and optimize process of projects to get to these goals. As production process is so cost sensitive most of them first look at the HR process and cut there and this is the exact reason why they might lose the trust of their teams.

In training process, Leaders need to train employees to obtain the skill set that they must have. So designing a process for knowledge management and sharing between skilled staff and those who are new to work can change the dynamic of this in the VO.

One of the managers from a VO mentioned that process is the mechanisms of work in the Virtual organization for example how a new start up decided to collect the talent needed from all around the world needs a certain kind of process. Designing a process which let VO customize their product for each customer is so important. So this process that combined with the latest digital technology, mass customization not only benefits the consumer, it offers the significant benefits to manufacturer as well. To produce and deliver these extended products, a number of VOs must make some changes to the way they receive demands and create a new process in their dynamic network.

One of the assessors in the interview mentioned that according to a study there are four key characteristics of virtual organization as process:

- ✓ First, virtual organization entails the development of relationships with a broad range of potential partners, each having a particular competency that complements the others.
- ✓ Second, virtual organizing capitalizes on the mobility and responsiveness of telecommunications to overcome problems of distance.
- ✓ Third, timing is a key aspect of relationships, with actors using responsiveness and availability to decide between alternatives.
- ✓ Last, there must be trust between actors separated in space for virtual organization to be effective.

We used this opinion when the group tried to finalize the group analysis in the questionnaire and we made sure that we covered all of these 4 points.

In one of the interviews an EFQM assessor mentioned that building a process to connect with other corporations, including competitors, suppliers, and clients (in our model environment), is so important for a VO because this enables it to efficiently and effectively pull together the resources needed to develop and deliver profitable solutions to client problems.

Other VO manager said that to design process, focus must be on relationships rather than the entities in relationships. The patterns of relationships are not the outcomes of individual characteristics but evidence of the processes by which corporate and individual success is

achieved and maintained. To move beyond description to explanation, the focus of research on virtual organization must shift from the static entities called virtual organizations to the fluid process through which positive outcomes are achieved.

2.2.7.6. Nine Result statements in questionnaire:

Here we will analyze the 9 statements of "Results" dimension in Virtual organization excellence model questionnaire as listed in table below.

Id	Statement	Sub-indicator
R1	Analyzing VO results like quality management, adherence to preset budget, lower costs, higher productivity, accuracy of financial contracts, development of new business, mission clarity.	VO overall results
R2	Checking VO's policy and strategy to see if they are helping organization to get to its ultimate goal	Strategy role in goal achievement
R3	Any increase or decrease in staff turnover, degree of task flexibility, accomplishment of assigned tasks, task efficiency, commitment and involving to the work is reviewed carefully	Degree of staff turnover Degree of task flexibility Degree of efficiency
R4	Checking financial results, profitability (costs versus revenue), improvement of products or services and sales per employee, market share growth.	Financial results Profitability Market share growth
R5	Observe any change in quality of leadership roles execution, virtual team management, coaching new team members, suggesting internal quality improvement strategies opportunities for promotion	Result of leadership Result of management
R6	Review environmental feedback like any change in number of customers, suppliers, partners, competitors, and their satisfaction.	Environmental feedback Any change in Stakeholders
R7	Any change in satisfaction indicator between members like role stressors, happy relation with their supervisors, committed to VO, levels of satisfaction with peers is important.	role stressors level of satisfaction
R8	Any higher performance in production timing from order to delivery, improvement in customize product or service, decrease resources consumption, reduced staff time and costs, improve process efficiency and productivity.	Production time Resource consumption Process efficiency
R9	Maximizing the diversity of skills, access to a greater pool of talent optimizing the fit of individuals to teams, increase trust, quantifiable measures of evaluating individual performance on VT	Diversity of skills Talent pool Trust increase

Table 36: Results Statement and sub-indicator

Based on literature review, field experiment, and expert meeting we found out that choosing appropriate statements for this category is quite challenging from 2 different perspectives. The first was when we wanted to extract "Result" related statements in "Model 300". In this step we must analyze the available literature and choose statements in a way that is compatible with the EFQM framework. Although we will have a detailed discussion regarding the difference of these 9 statements and the 4 "Result" criteria in EFQM in chapter 4 , but here we will analyze this concept a bit more. These are four "results" criteria in EFQM model.

1. **Customer Results:** 6a. Perception Measures. 6b. Performance Indicators.
2. **People Results:** 7a. Perception Measures. 7b. Performance Indicators.
3. **Society Results:** 8a Perception Measures. 8b. Performance Indicators.
4. **Key Performance Results:** 9a Key Performance Outcomes. 9b Key Performance Indicators.

Appendix A provides more explanations regarding each of these 4 factors along with the original scales for measuring them. These 4 factors gave us clearer image of what will be the "Result" statements in VOEM and what we need to look for in the literature. In the next step we discussed about centralizing all the "Result" related statements in expert's meeting. In the following section we will talk more about this aspect.

The next challenge was to explain and demonstrate the exact meaning of Results for the Virtual Organization experts who did not have enough experience working with EFQM as a assessment tool in an organization. They questioned the fact that how in EFQM and in VOEM model we expect to have a relationship between Enablers and Results while none of these two are indicating on real enabling measures and real performance results. For example in Results criteria instead of collecting the data about "To what extend a VO got to its financial goals?" we have the statement of the importance of "Reviewing financial results" function!

To overcome these 2 challenges we started by discussing about the nature of EFQM and what we expect to have as a unique "Result" criteria. After we made sure of the fact that the entire member's in the meetings are on the same page we finalized these statements.

In this study beside the discussion in chapter 4, it worth mentioning that there are other researches emphasizing on the same subject. For example, Schmidt, Berjoyo et in their research in 2013 indicated the existence of TQM factors in the EFQM excellence model and, their impact on "key results". Same as our study, they centralized the all the different criteria of EFQM into one "Key Business Results" which included 2 sub-criteria (9a.Key performance outcomes 9b. Key performance indicators). They used the regression techniques to point out this positive influence of the strategic management, partnership & resources and processes management on the key business. This was one of the most recent studies which indicated the relationship between Enablers and Results while Results has its natural meaning in the EFQM.

We also found that "Results" is a concept which is fully accepted in the excellence management models but due to the lack of any excellence models especially for VOs, using this word in quite rare in this area. Considering all said we extracted statements which pointed at what we expected from the word "Result"(for example, productivity, effectiveness and performance).

Beside this we found many other bibliographical references from the existing literature to improve and set up the questions. For "Results" part of the questionnaire, we used references which are listed in Appendix G-6.

Evidence from field experiment:

The experience in Tstab was only in the phase of research and development (R&D) so focusing on results and trying to measure it was a bit an early task. But the important point that we experienced was to create an online feedback for all members; this gave them an eye on results of R&D process to adjust their performance in the moment.

At the early stage we only expected our team members to go out and analyze market and identify the potential competitors. Then based on the level of research and development phase we had to focus on the validation process. Most of team members had to go out of their home or office to talk to the possible customers and see what they really want. We came up with a specific questions and a prototype of our final product to see if customers feel the same way about this minimum valid product (MVP) as we do.

Other step in environment management in Tstab was to be accountable for customers and listen to the changes that they want in the product. Beside this team members must be accessible, have good communication, remain in the transparent area, be flexible and be responsive to all the duties. Regarding the product all members have to be responsible for the quality and value of the product that is among important results.

Evidence from experts meeting and interview:

In the literature review of virtual organization there is much evidence of productivity and effectiveness but mentioning "Results" to indicate these two was quite rare as this word is mostly used in the EFQM atmosphere. In the interviews and expert meeting we discussed about the importance of results. There was a unity that this words need to get redefined in Virtual organization world to see what does it mean and the following definition suggested:

Excellent Virtual organizations comprehensively measure and achieve outstanding results with respect to the key elements of their policy and strategy. This Virtual organization measures key results defined by the organization which agreed in their policy and strategies. This kind of organizations need to define the measures in order to monitor and understand the performance any time in the process of projects, these measures are like:

- ✓ Market related and general data: sales, share price
- ✓ Profitability: gross margins, earnings, contribution margin
- ✓ Market Share, Time to market, Success rates, Volumes, Process performance.
- ✓ Cash flow, Depreciation, Maintenance costs, Project costs, Credit ratings.
- ✓ Processes: performance; assessments; innovations; cycle times
- ✓ External resources including partnerships: supplier performance, number of partners
- ✓ Technology: innovation rate, value of intellectual property
- ✓ Information and knowledge: accessibility, integrity, value of intellectual capital

2.2.7.7. Nine Environnement statements in questionnaire:

Here we will analyze the 9 statements of "Environment" dimension in Virtual organization excellence model questionnaire as listed in table below.

Id	Statement	Sub-indicator
E1	Comparing and revising quality of the products or service offered to customer with competitors.	Reviewing and revising products based on customers and environment data
E2	Providing VO with detailed information about market, competitors, legal and environmental issues and all the partners comments and feedbacks	periodicity Market analysis legal issues analysis
E3	Plan customer's full experience from ordering and assigning the best team for the project to final delivery.	Full customer experience from order to delivery
E4	Creating an access point for customers in VO's portal to see and comment in different phase of project.	Customers access point in VO portal
E5	Analyzing market to develop new products or services ahead of competitors.	Use market analysis to develop new products
E6	Customers get full 24/7 support after purchasing their product or service.	24/7 customers support
E7	VO must have common inner criteria with partners like: matching goals, algorithms, skills and capabilities, technical and economical preferences, common collaborating infrastructure and commitment to provide best quality	Partners selection based on inner alliance
E8	Having common outer criteria with partners like: cost requirement, collaboration history, reliability indicators, and readiness to join the collaborative process.	Partners selection based on exterior alliance
E9	Provide all partners or suppliers with an access point in VO's portal to share knowledge	Partners and suppliers access point in VO portal

Table 37 : Environment Statement and sub-indicator

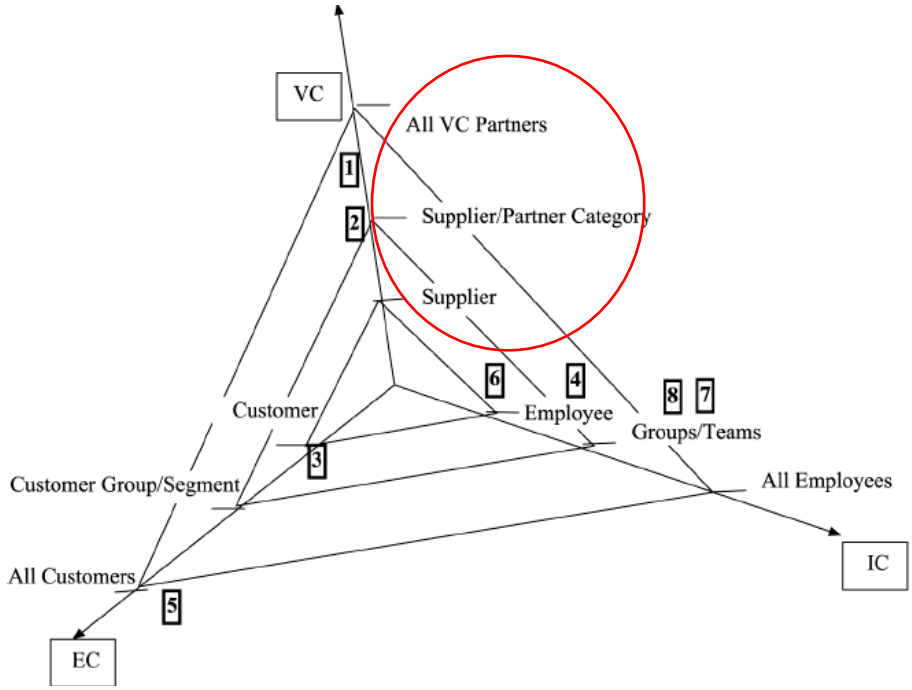
Evidence from Literature review:

Choosing these statements were totally based on the literature review, as we explain briefly in the following lines:

… Shekhar in her 2006 analysis created a model to show directionality and granularity of virtuality .Shekhar believes that Virtuality can manifest itself in different ways.
Her analysis of the major manifestations points to the fact that these can be aligned along any one of three directions: …

4. The external customer (EC) direction, which would include virtuality with respect to all customer categories;
5. The internal customer (IC) direction, which would include virtuality with respect to employees and other individuals within the organization;
6. The value chain (VC) partner direction that would include inter-organizational linkages with suppliers, alliance partners, subsidiaries, service providers, and so on. *(Statement E4)*

Figure below provides a pictorial view of the combined representation of the direction and granularity.



Directionality and granularity of virtuality (shekhar, 2006)

…The VC direction can be studied with respect to, a single supplier, supplier category or all value chain partners. Such a representation recognizes the fact that virtuality as a construct is not necessarily relevant only to the organization as a single entity. It is as relevant to an employee or a project team within an organization as it is to the organization or indeed the meta-organization (extended organization). *(Statement E1)*

…Byrne (1993) defined VO as a temporary network of suppliers, customers, and rivals.

…. altogether The VE concept is defined somewhat differently, and it needs more advanced inter organizational information technology. They operate as nodes in a network of suppliers, customers, engineers, and other specialized service functions (Davidow & Malone, 1995). *(Statement E1 & E3)*

… Zaccaro and Bader (2003) noted that today‘s organizational leader grapples with two interrelated forces: the increasingly global dispersion of divisions and subunits, customers, stakeholders, and suppliers of the organization; and the exponential explosion in communication technology that has led to greater frequency of daily interactions with colleagues, coworkers, subordinates and bosses dispersed geographically. *(Statement E1)*

…This new paradigm provides a range of new opportunities like the ability to instantly communicate one-on-one with employees, customers, and suppliers; the capability to use talent wherever it exists; the opportunity to enhance organizational performance by assembling better multi-functional teams, and to improve better customer satisfaction by using the follow the sun methodology; the ability to cut costs; … (Das gupta, 2011) *(Statement E1 & E6 & E9)*

… In this case, the Post-Heroic Leader interacts with many individuals, suppliers, customers, employees, other managers, community not simply direct report employees. Visually, the Heroic Leader operates in a traditional organizational pyramid, and the Post-Heroic Leader acts as a hub to various organizational spokes in a wheel. These arrangements are illustrated in the diagram below. (Etcher, 1997) *(Statement E1)*

However, while e-commerce may mean that asking for quotes from an increasing number of sellers can mitigate ignorance of the price of a very well defined product, overcoming ignorance of product quality and other supplier capabilities may be more difficult. Roberts B, Svirskas A, Matthews B (2005). *(Statement E5)*

Benetton, the French sportswear marketer, utilizes a global virtual value chain in coordinating the production and shipments of garments and materials of its virtual global production and channel of distribution system. The virtual value chain passes through a number of suppliers generating textiles, designing and manufacturing clothing, and providing distribution services to retailing establishments. (Palmer JW, Speier CA, 1997) *(Statement E5)*

…. Compared to collocated teams, virtual team members come from several functions, belong to several organizations, and represent customers or suppliers of the firm. (Langevin P, 2008). *(Statement E5)*

…"The virtual corporation can be defined as a temporary network of independent companies, suppliers, customers, even erstwhile rivals linked by information technology to share skills, cost, and access to one another's market." (Fitzpatrick WM, Burke DR, 2000) *(Statement E1)*

…In this model, the team of producers, suppliers and customers is networked through cyberspace and works collectively and collaboratively towards the achievement of common goals like creating a product or service. (Durai P, 2012) *(Statement E4& E9)*

Extended enterprises span company boundaries and include complex relationships between a company, its partners, customers, suppliers and market. The organizational aspects of an extended enterprise can be summarized as globalization of exchanges, subcontracting and partnership. (Martinez MT, Fouletier P, Park KH, Favrel J (2001) . *(Statement E4& E9)*

… The authors attempted to identify and named the confirmed factors based on the principle of being concise without losing clarity of meaning. After extracting the factors, Variables with higher loadings are considered more important and have greater influence on the name of selected reduced factors. The names and contents of four derived factors are: Factor 4: It consists of Increase coordination between departments and Increase coordination with suppliers/ customers is named Increase coordination. (Ale Ebrahim N, Ahmed S, Abdul Rashid SH, Taha Z, 2010) *(Statement E4& E6 & E9)*

…As the organizational trend, the work of organizations and leadership has become increasingly global. As a result, VOs' divisions and subunits as well as customers, stakeholders, and suppliers may extend worldwide. Today many e-leaders are interacting with and VT members at different corporations, industries, or even countries. He R (2008)

…. Due to increasing and changing product features, by-and-large product development has become more complex, with increasing complexity in the supply chain. Therefore, more close collaboration between customers, developers, and suppliers has become vital. The foretold collaborations often involve individuals from different geographical locations that could now be brought together by using the various types of information technology (IT). Ale Ebrahim, Nader and Ahmed, Shamsuddin and Abdul Rashid, Salwa Hanim and Taha, Zahari, (2012)

…Organizational interfaces or boundaries are generally linked to their business processes. These interfaces include internal interfaces such as employee interfaces to business processes and external interfaces such as stockholder, customer, supplier, trading partners, and government agencies interfaces to business processes…. Virtual corporations are corporations that have expanded their value chain to include suppliers and / or customers to deliver better value to their customers. …There are a wide variety of information and communication technologies available from a wide variety of suppliers, which provide the support for virtual organization. …. The following figure, illustrates these components and their relationships using a model from systems theory. System inputs include suppliers, resources, and people. Processes are business processes and organizational controls. Processes transform inputs into outputs (products and services). (Gould D, 1997) *(Statement E7& E8)*

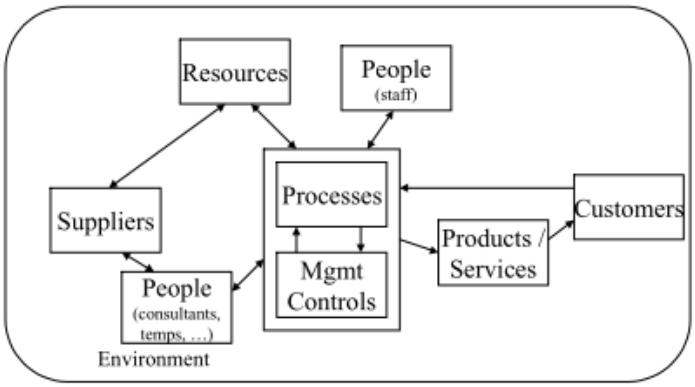


Figure 39 : VO system

We also use many other bibliographical references from the existing literature to improve and set up the questions. For this part "Environment" of the questionnaire, used references is listed in Appendix G-7.

Evidence from field experiment:

As T-stab was a young Virtual organization in the form of startup, we did not observe challenges from suppliers and partners. In order to develop a good market fit product we had to go and ask potential customers about their need and their expectations. So in this category we more and more had to deal with the demands and market characteristics like who are the most important competitors and which products is the closest one to the one that we planned to develop.

Evidence from interviews and experts meeting:

As we discussed in expert's meeting and interviews basically the structure of partnerships and strategic alliances can be facilitated via the VO structure. This new structure helps to grow the number of partnerships and interorganizational alliances among different firms. This would give VOs increase competitive edge and new customers.

One of the interviewee mentioned that "VO's producers, suppliers and customers are networked through cyberspace and works collectively and collaboratively towards the achievement of common goals like creating a product or service. The most important of this alliance of all the environmental elements is to ensure complete client satisfaction and get repeat orders. VOs work towards long-term cooperation between the virtual organization and its clients".

Other comment was from questionnaire participants: "beside VTs there are other entities in the environmental atmosphere of a virtual organization including customers and suppliers. The process of their interaction has specific rules and is also much less structured and produces much shorter documents than inside ones. To develop a market fit product it is necessary to require and allow ideas from VO's environment to come from anywhere and at any time".

In the expert meeting we also discuss about the concept of temporary relation of VO with its partners and suppliers. Literature of virtual organization indicated that VOs are usually a temporary group of independent companies formed to exploit a specific opportunity. They may be suppliers, manufacturers, marketers, customers, and even competitors and Virtual corporations are based on electronic linkages among companies and individuals otherwise separated by great distances. Once the job is finished, the group and its teams will generally disband and this is the main reason of short relation of the VO with the environment.

2.2.8. Validation of the Questionnaire

The questionnaire designed for the study was subjected to a validation process for face and content validity. Face and content validity have been defined by Mc Burney (1994) as following:

- Face validity is the idea that a test should appear clearly for the reader to test what it is supposed to test; and
- Content validity is the notion that a test should sample the range of behavior represented by the theoretical concept being tested.

In the validation process of this study, copies of the research questions were given to 6 virtual Organization experts and EFQM excellence model assessors. These experts were chosen among the employees or managers of a current VO or quality and excellence department of big corporations. These experts went through the research questions and the questionnaire carefully to ascertain the appropriateness and adequacy of the instrument. They suggested structuring the questionnaire in the Likert fashion, on a 10 point scale instead of modified 4 point Likert fashion (Nworgu 1991).

Researcher prefers the modified Likert scale because according to normal Likert scale, strongly agree assigns 5 points, agree 4 points, undecided 3 points, disagree 2 points and strongly disagree 1 point. Many researchers and educationists feel that there is no logical enough reason to assign the weight of 3 points to somebody who is undecided on a given issue. Therefore in this study we preferred modified 10 Likert scale to be more compatible with the current EFQM scaling format. However the other useful observations and suggestions by the experts were modified and the corrections were made.

Having validated the questionnaire, a pilot testing was carried out using 5 VO experts and 4 EFQM excellence assessors from Linked In. This was done in order to see:

- How the experts will react to the questionnaire;
- Whether the items are clear enough and easily understood;
- Whether there is the need to include more items in certain areas;
- Whether there are some items to which they would not like to respond;
- As well as to determine the possibility of the proposed method of data analysis for the study.

However, from the pilot test, the researcher was able to understand the ambiguity of some items and so had to modify it to the level of the questionnaire. In some other parts the way that statements were presented changed to be more simple and easy English wise.

2.2.9. Limitation in data collection

The main concern of conducting this survey research is the sampling. We faced difficulty in convincing communities to send questionnaire link trough their network via weekly newsletter and there was couple of limitation for that:

- They asked for a certain amount of money
- They had some concerns regarding the personal information questions in the questionnaire
- They did not trust the survey provider website
- They did not have any rule or routine to ask their network to be part of this kind of projects.
- They didn’t want to ruin their newsletter reputation

Also we faced limitation convincing the respondents to answer to the survey. We received many comments from the recipients explaining why they didn’t want to participate in this research. These comments can be categorized in number of topics, including:

- Time consideration,
- Length of questionnaire
- They thought that they don’t have enough experience in both VO and excellence models.

2.2.10. Model developing

The forth facet of the research strategy was model development. The EFQM theoretic preliminary conceptual model introduced in Chapter 1 guided the initial stages of the research by identifying a fundamental framework for what needed to be built as the result of the

research as well as reflecting the researcher's previous experience and knowledge of standards development. The EFQM model provided a sensitizing framework for approaching the topic of Organizational Excellence.

In this research data collection was not the only source for developing the Main Model. Instead, the current EFQM model organized concepts such as inputs, outputs, processes, information feedback, boundaries, and environment that the researcher explored indirectly in data collection. The available EFQM model oriented the researcher, at least initially, towards inclusion and openness to discovering what data to collect rather than setting out limits and exclusions on what to attend or collect. Patton (1990) points out, however, that the researcher "does not enter the field with a completely blank slate" and that "some way of organizing the complexity of reality is necessary." He suggests that sensitizing concepts serve such a purpose by providing a "basic framework highlighting the importance of certain kinds of events, activities, and behaviors" (Patton, 1990).

Base on this reality this research did not have a goal of developing a brand new and generalizable or predictive model. Instead, the study was aimed to develop a descriptive model that would represent EFQM model.

One big aim of this study is to develop a model that can be used right away to asses Virtual Organizations like EFQM framework. This can help assessors to get familiar with model much faster .While keeping within a system– theoretic framework, final conceptual Virtual organization excellence model presented in Chapters 4 developed based on VO literature analysis, field experience, Experts interviews and survey data collection.

2.3. Chapter 2 summary:

In the first part of this chapter we analyzed the Epistemology (known as theory of knowledge) of this study as a branch of philosophy. Epistemology is concerned with questions about the meaning, origins, accuracy, and ways of knowledge. The history of evolution of epistemology in general, and then social and organizational epistemology were briefly reviewed.

Being aware that there is no single theory or single philosophy of science that is binding for researchers, and based on the framework represented by Becker, Joerg and Niehaves (2005), we addressed some basic epistemological questions to reach an understanding of what we are dealing with in our current project; these include ontological question, the relation question, the concept of Truth, sources of cognition, and methodological questions.

Then, based on classification described by Burrell and Morgan (1979), four main socio-philosophical debates were explored: Nominalism vs Realism; Anti-Positivism – Positivism; Voluntarism vs Determinism; and Ideographic vs Nomothetic Theory. Paradigms of organizational studies were the next topic of discussion. The existing sociological theories and approaches in organizational studies include functionalist, interpretive, radical humanist, and radical structuralist paradigms.

In this study besides discussing about the characteristic of VO the main objective is to analyze the conditions of performance of the VOs, through the study of the different models of excellence in organizations, particularly models specific to VOs. This goal makes radical humanist and radical structuralist paradigms unsuitable for the current project, since we are trying to study the behaviors of the Virtual Organizations, not seeking to impose radical changes in virtual organization, the way they are managed, or how they perform. Although the epistemological view have been chosen, researcher is not committed to any believe, as Popper and Kuhn both believe that commitment to one belief is unacceptable.

In the second part of this chapter we discussed about the methodology of this study. As the objective in this study is to create an excellence Model for Virtual organizations we adopted a pluralist (4-stage) approach method. The use of multiple methods such as surveys and field experiment increases the reliability of the study. The first stage of this study engaged extensive literature review to develop and create a preliminary framework and foundation for Excellence in Virtual Organization. The second stage of this study employed the field experiment to study the preliminary framework. The third stage involved the use of survey to validate and further refine the preliminary framework developed earlier.

We also explained about the experience that we had by developing a real virtual organization called Tstab. Tstab's mission was to develop a training stabilizer application on android platform. Then we discussed about the process of sampling and getting to 352 responses in the period of 2 month. Then process of "Virtual Organization Excellence questionnaire" design as our data collecting tool analyzed. This questionnaire is consisted of 59 statements (belongs to 7 different main factors) that address the essential process and functions that effects productivity and excellence of a VO.

In the next step we analyzed 7 different main factors one by one and assigned each 59 statements a sub indicator to clarify the main message in each. As we wanted to show how we came up with this statements in the questionnaire in each 7 group we brought some evidence from the Literature review and we underlined the related part. In each section we also discussed about related challenges and lesson learned during field experience. At the last part we mentioned about some of the points we found during the group meeting or exact opinions of an interviewees.

At the end we discussed about how we conducted the process of validation of the questionnaire and what was the Limitation in the. These 2 steps was the beginning of the process of Model developing. In the next chapter we will discuss about Data Analysis & results of the current study.

3. Chapter three: Data Analysis & results

3.1. Introduction

In this section, study data will be statistically analyzed. These analyses conducted using Excel, SPSS 16, IBM AMOS 22 software provided in two separate parts: descriptive and deductive. In the descriptive part, the statistical frequency of each characteristic of population shows measures. In the deductive part, reliability test, T-test, Friedman ANOVA and confirmatory factor analysis used to answer the study questions.

3.2. Descriptive Analysis

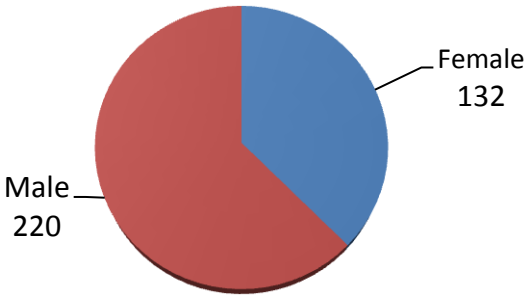
The total reliable number of subjects was 352. Figure below show the distribution of responses in each country.

Figure 40: Distribution of responses in the world

Among 352 respondents, 132 were female and 220 were male.

Responses		Frequency	Percent
Gender	F	132	37.5
	M	220	62.5
	Total	352	100.0

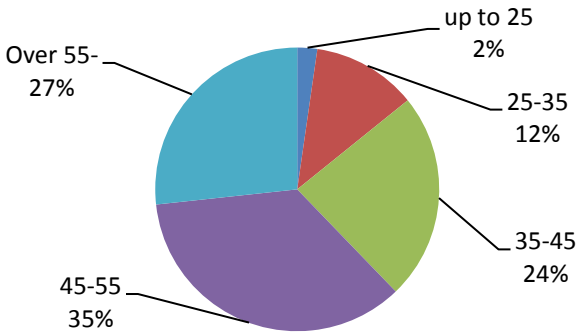
Table 38 : Gender distribution of the study



Among 352 respondents age wise, 8 were up to 25, 42 were 25 to 35 years old, 83 were 35 to 45, 125 were 45 to 55 and 94 were over 55.

Responses		Frequency	Percent
Age	up to 25	8	2.3
	25-35	42	11.9
	35-45	83	23.6
	45-55	125	35.5
	over 55	94	26.7
	Total	352	100.0

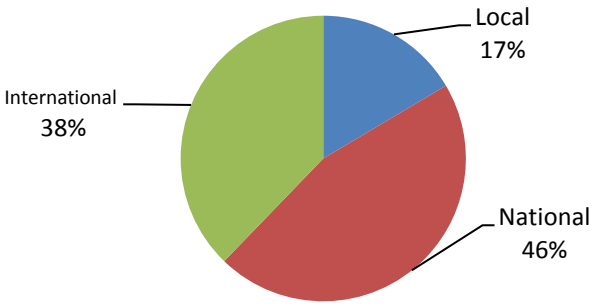
Table 39 : Age distribution of the study



Among 352 respondents in terms of Company scale, 58 were working in Local, 161 were in national and 133 were working in an International Company.

Responses		Frequency	Percent
Company Scale	Local	58	16.5
	National	161	45.7
	International	133	37.8
	Total	352	100.0

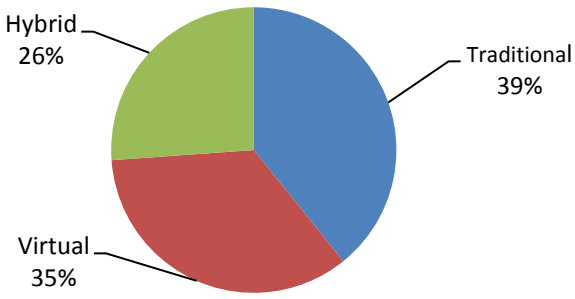
Table 40 : Company scale distribution of the study



Among 352 respondents in terms of Company type, 138 were working in Traditional organization, 122 were in Virtual organization and 92 were working in Hybrid organization.

Responses		Frequency	Percent
Company Type	Traditional	138	39.2
	Virtual	122	34.7
	Hybrid	92	26.1
	Total	352	100.0

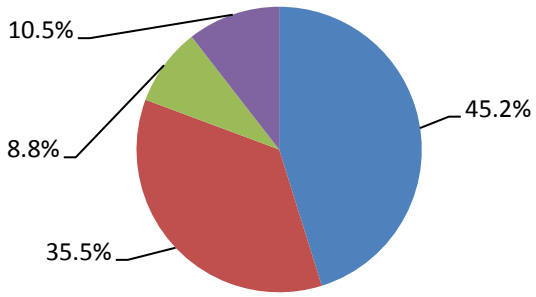
Table 41: Company type distribution of the study



Among 352 respondents in terms of Position, 159 were Leaders, 125 were Managers, 31 were Project manager and 37 were Team managers.

Responses		Frequency	Percent
Position	leader	159	45.2
	Manager	125	35.5
	Project manager	31	8.8
	Team member	37	10.5
	Total	352	100.0

Table 42: Position distribution of the study



3.3. Deductive Analysis

3.3.1. Reliability of measuring instrument

Two of the most prominent criteria of quality of measurement instruments in the behavioral sciences are validity and reliability. Validity refers to whether the test is "on-target"; is the test measuring what you intend for it to measure? Reliability addresses the consistency of results. It is mostly measured by Cronbach's alpha, which is an indication of internal consistency and the degree to which items are homogeneous (Cooper and Emory, 1995; Saraph et al., 1989).

The value of Cronbach's alpha was computed for each criterion, or in more technical words, for the construct or abstract concept. Computations were carried out on the SPSS software. Table I shows these values, the number of items (sub-criteria) of each construct (criterion) and the 95 per cent lower and upper confidence limits based on tables in Duhachek and Iacobucci (Duhachek & Iacobucci, 2004).

Cronbach's alpha is most commonly used when you have multiple Likert questions in a survey/questionnaire that form a scale and you wish to determine if the scale is reliable. In this research we have a 59 question questionnaire. Each question was a 10-point Likert item. In order to understand whether the questions in this questionnaire all reliably measure the Excellence in Virtual organization, a Cronbach's alpha was run on a sample size of 352 experts.

SPSS produces many different tables to check the reliability. The first important table is the Reliability Statistics table that provides the actual value for Cronbach's alpha. Cronbach's alpha simply provides you with an overall reliability coefficient for a set of variables (e.g., questions).As shown in table we can see that Cronbach's alpha is 0.934, which indicates a high level of internal consistency for our scale with this specific sample.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.934	.934	59

Table 43: Reliability Statistics of the study

SPSS besides Cronbach's Alpha for all the 59 questions provides an expected value of alpha if a certain item were to be deleted. The resulting Cronbach's alpha is 0.934 as indicated in Table above. In Table below the *Item-Total Statistics* table presents the *"Cronbach's Alpha if Item deleted"* in the final column.

Item-Total Statistics					
V	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
E1	439.48	1876.062	.607	.698	.932
E2	439.16	1914.119	.388	.543	.933
E3	439.30	1894.975	.498	.652	.933
E4	439.28	1917.996	.344	.557	.933
E5	439.15	1910.580	.383	.568	.933
E6	439.19	1907.643	.453	.615	.933
E7	439.25	1890.910	.530	.593	.932
E8	439.32	1891.821	.492	.616	.933
E9	439.26	1911.790	.433	.633	.933
I1	437.91	1910.356	.355	.634	.933
I2	438.65	1885.061	.466	.595	.933
I3	438.67	1878.454	.531	.650	.932
I4	439.14	1903.349	.427	.612	.933
I5	438.22	1895.180	.488	.696	.933
I6	438.87	1893.140	.460	.572	.933
I7	439.02	1890.393	.489	.588	.933
I8	438.78	1886.623	.465	.641	.933
I9	439.09	1864.028	.598	.751	.932
K1	438.14	1919.138	.275	.628	.934
K2	439.62	1890.561	.402	.704	.933
K3	438.73	1908.237	.458	.637	.933
K4	439.46	1898.705	.409	.583	.933
K5	438.94	1901.700	.439	.701	.933
K6	439.07	1883.949	.455	.617	.933
L1	437.97	1910.264	.377	.605	.933
L2	438.60	1921.558	.262	.489	.934
L3	439.34	1855.079	.559	.690	.932
L4	438.38	1906.332	.396	.443	.933
L5	438.56	1917.785	.329	.532	.934
L6	438.20	1893.835	.521	.696	.932
L7	438.30	1890.520	.512	.631	.932
L8	437.95	1932.260	.220	.594	.934
L9	438.25	1913.269	.376	.701	.933
P1	438.78	1913.383	.337	.515	.934
P2	438.88	1914.553	.369	.497	.933
P3	438.49	1912.695	.387	.550	.933

P4	438.82	1907.163	.417	.512	.933
P5	439.09	1902.108	.470	.553	.933
P6	438.82	1913.764	.346	.568	.933
P7	438.82	1884.804	.599	.680	.932
P8	439.09	1892.342	.456	.608	.933
R1	438.89	1878.050	.464	.718	.933
R2	438.61	1915.173	.304	.502	.934
R3	438.67	1911.822	.385	.445	.933
R4	438.41	1934.066	.230	.352	.934
R5	438.47	1923.834	.317	.379	.934
R6	438.52	1920.638	.299	.438	.934
R7	438.55	1921.433	.304	.420	.934
R8	438.89	1898.205	.464	.444	.933
R9	438.50	1908.228	.420	.696	.933
T1	438.18	1881.925	.550	.649	.932
T2	438.37	1923.019	.338	.590	.933
T3	438.48	1881.886	.553	.629	.932
T4	438.25	1890.269	.493	.690	.933
T5	437.93	1900.693	.458	.615	.933
T6	438.43	1917.687	.264	.616	.934
T7	438.03	1904.691	.517	.652	.933
T8	438.16	1901.198	.439	.728	.933
T9	438.25	1874.782	.568	.734	.932

Table 44: Total Statistics of the study

This column presents the value that Cronbach's alpha would be if that particular item was deleted from the scale. We can see that removal of any question would not result in a lower Cronbach's alpha but this shows that each variable have quite same Cronbach's alpha. Therefore, we would not want to remove these questions.

3.3.2. Validity of measuring instrument

As previously discussed, validity indicates that the instrument is measuring what it is supposed to measure. Three types of validity are most common in business and organizational research: content validity; construct validity and criterion-related validity (Brewerton and Millward, 2001; Sekaran, 2003).

Content validity Defined as “the extent to which it provides adequate coverage of the topic under study” (Cooper and Emory, 1995, p. 149). This type of validity is mostly based on the analysis of the target domain required, and drawn on expert judgment (Brewerton and Millward, 2001). Content validity is demonstrated in this instrument in two ways. First, the “analysis of the target domain” was achieved through the literature review and Extensive Literature Review which has been discussed in chapter 1, which strength the theoretical development of the model (Bassioni et al., 2004). Second, the “expert judgment” as mentioned in this chapter was based on the evaluation of expert (Bassioni et al., 2005), and the evaluation of the questionnaire in the pilot study.

Construct validity shows the extent to which, items of a construct, measure the same construct (Flynn et al., 1994), i.e. do not measure multiple constructs. Construct validity can

be demonstrated by a factor analysis on the items of each construct (Cooper and Emory, 1995; Flynn et al., 1994).

In following 7 sub sections we will show the factor analysis results and associated Screen plot conducted on each group of questions relating to one factor in the questionnaire (using SPSS software). The extraction method used was "principal component analysis".

Each section includes 3 tables and one screen plot. First table in each section shows how one factor can interprets the biggest amount of variance of the sample and the difference that it has with others. The KMO and Bartlett's Test table shows the significant value of this test in each case, which in all of them is less that 0.05 (significant). And finally the screen plot clearly shows the difference between first factor and others (and based on tables) shows the possibility of extraction of a single factor in that specific group.

3.3.2.1. Principal component analysis for Environment factor

Component	Initial Eigenvalues[a]			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
E1	7.896	37.494	37.494	7.896	37.494	37.494
E2	3.035	14.411	51.905			
E3	2.049	9.732	61.637			
E4	1.649	7.830	69.467			
E5	1.593	7.563	77.030			
E6	1.485	7.053	84.083			
E7	1.312	6.229	90.312			
E8	1.221	5.800	96.113			
E9	.819	3.887	100.000			

a. When analyzing a covariance matrix, the initial eigenvalues are the same across the raw and rescaled solution

Component Matrix[a]		
	Raw Component 1	Rescaled Component 1
E1	1.262	.765
E2	.644	.444
E3	.955	.608
E4	.784	.523
E5	.874	.558
E6	.823	.583
E7	1.003	.641
E8	1.085	.655
E9	.858	.627

a. 1 components extracted.

KMO and Bartlett's Test[a]		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.802
Bartlett's Test of Sphericity	Approx. Chi-Square	712.990
	df	36
	Sig.	.000

a. Based on correlations

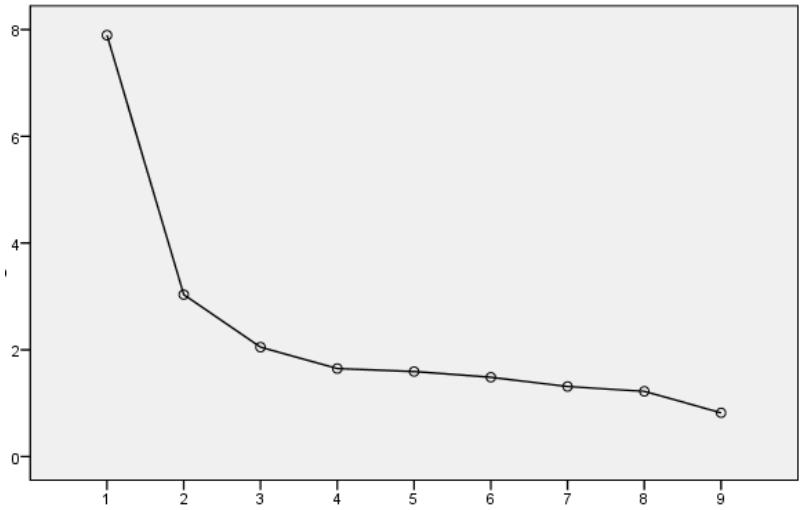


Table45 : Tables and Screen plot of Factor analysis of Environment factor

3.3.2.2. Principal component analysis for ICT factor

Component	Initial Eigenvalues[a]			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
I1	10.082	36.243	36.243	10.082	36.243	36.243
I2	3.800	13.660	49.903			
I3	3.230	11.612	61.515			
I4	2.633	9.467	70.982			
I5	2.294	8.246	79.228			
I6	1.875	6.738	85.966			
I7	1.463	5.259	91.225			
I8	1.298	4.667	95.891			
I9	1.143	4.109	100.000			

a. When analyzing a covariance matrix, the initial eigenvalues are the same across the raw and rescaled solution.

Component Matrix[a]		
	Raw Component 1	Rescaled Component 1
I1	.810	.480
I2	1.073	.565
I3	1.135	.624
I4	.945	.591
I5	.844	.529
I6	1.048	.605
I7	.986	.581
I8	1.131	.606
I9	1.425	.752

a. 1 components extracted.

KMO and Bartlett's Test[a]		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.744
Bartlett's Test of Sphericity	Approx. Chi-Square	715.675
	df	36
	Sig.	.000

a. Based on correlations

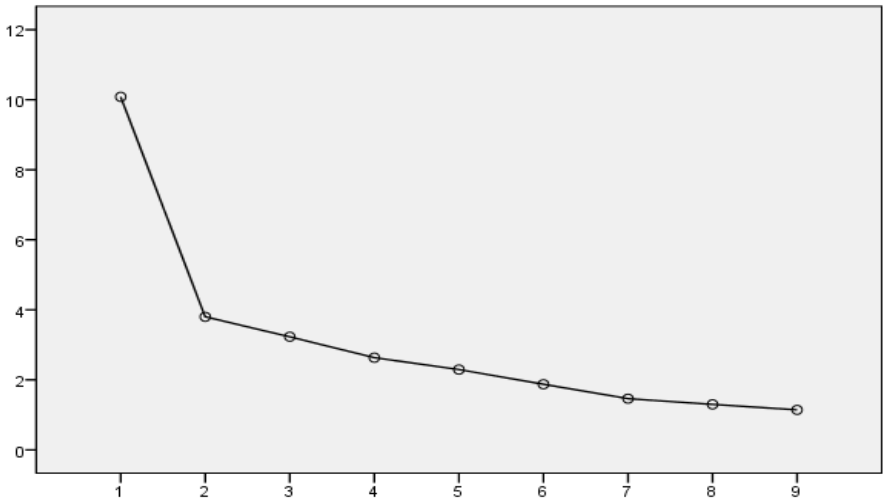


Table 46 : Tables and Screen plot of Factor analysis of ICT factor

3.3.2.3. Principal component analysis for Knowledge factor

Component	Initial Eigenvalues[a]			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
K1	7.161	38.059	38.059	7.161	38.059	38.059
K2	3.446	18.317	56.376			
K3	3.101	16.483	72.859			
K4	2.266	12.042	84.900			
K5	1.764	9.375	94.275			
K6	1.077	5.725	100.000			

a. When analyzing a covariance matrix, the initial eigenvalues are the same across the raw and rescaled solution.

Component Matrix[a]		
	Raw Component 1	Rescaled Component 1
K1	.852	.476
K2	1.441	.712
K3	.805	.582
K4	.909	.510
K5	.876	.548
K6	1.455	.740

a. 1 components extracted.

KMO and Bartlett's Test[a]		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.656
Bartlett's Test of Sphericity	Approx. Chi-Square	304.090
	df	15
	Sig.	.000

a. Based on correlations

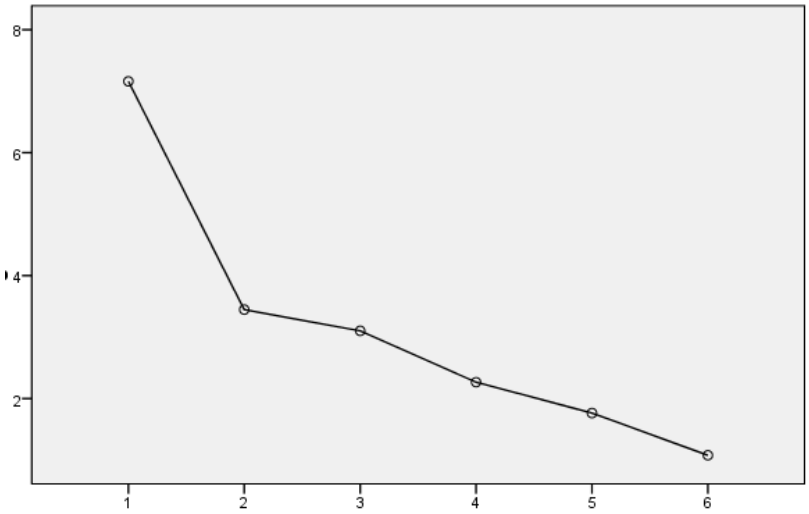


Table47 : Tables and Screen plot of Factor analysis of Knowledge factor

3.3.2.4. Principal component analysis for Leadership factor

Component	Initial Eigenvalues[a]			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
L1	7.926	31.130	31.130	7.926	31.130	31.130
L2	3.843	15.095	46.225			
L3	2.823	11.089	57.314			
L4	2.644	10.384	67.698			
L5	2.589	10.170	77.868			
L6	1.780	6.993	84.862			
L7	1.468	5.766	90.627			
L8	1.343	5.277	95.904			
L9	1.043	4.096	100.000			

a. When analyzing a covariance matrix, the initial eigenvalues are the same across the raw and rescaled solution.

Component Matrix[a]		
	Raw Component 1	Rescaled Component 1
L1	.717	.449
L2	.730	.411
L3	1.831	.835
L4	.797	.488
L5	.742	.473
L6	.940	.615
L7	.992	.610
L8	.322	.202
L9	.607	.400

a. 1 components extracted.

KMO and Bartlett's Test[a]		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.668
Bartlett's Test of Sphericity	Approx. Chi-Square	501.996
	df	36
	Sig.	.000

a. Based on correlations

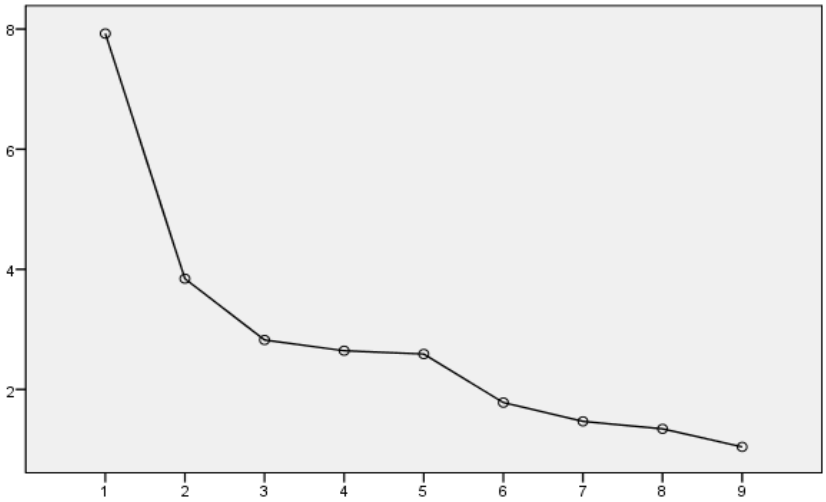


Table48 : Tables and Screen plot of Factor analysis of Leadership factor

3.3.2.5. Principal component analysis for Process factor

Component	Initial Eigenvalues[a]			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
P1	6.898	34.645	34.645	6.898	34.645	34.645
P2	2.674	13.429	48.074			
P3	2.616	13.137	61.211			
P4	1.938	9.732	70.943			
P5	1.808	9.080	80.023			
P6	1.620	8.137	88.160			
P7	1.262	6.340	94.500			
P8	1.095	5.500	100.000			

a. When analyzing a covariance matrix, the initial eigenvalues are the same across the raw and rescaled solution.

Component Matrix[a]		
	Raw Component 1	Rescaled Component 1
P1	.824	.492
P2	.835	.555
P3	.621	.416
P4	.873	.568
P5	.952	.638
P6	.947	.584
P7	1.053	.698
P8	1.209	.684

a. 1 component extracted.

KMO and Bartlett's Test[a]		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.758
Bartlett's Test of Sphericity	Approx. Chi-Square	451.785
	df	28
	Sig.	.000

a. Based on correlations

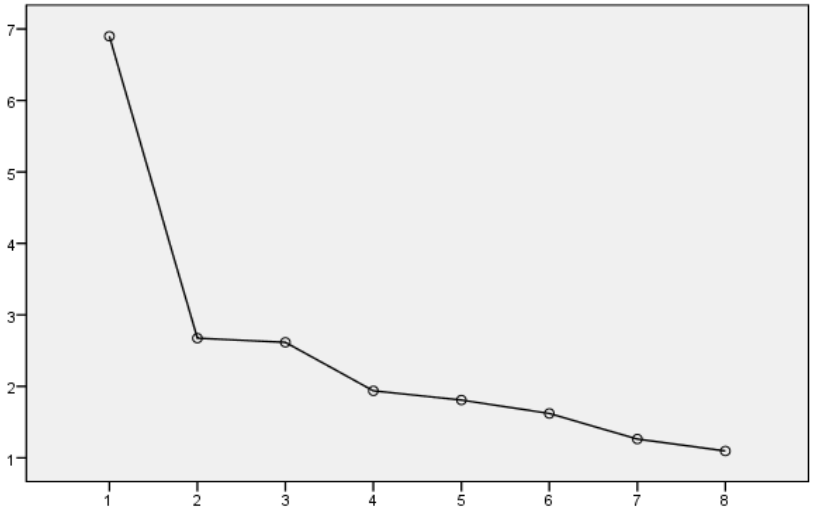


Table49 : Tables and Screen plot of Factor analysis of Process factor

3.3.2.6. Principal component analysis for Results factor

Component	Initial Eigenvalues[a]			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
R1	8.134	34.286	34.286	8.134	34.286	34.286
R2	3.440	14.502	48.788			
R3	2.645	11.151	59.939			
R4	1.859	7.836	67.775			
R5	1.815	7.649	75.424			
R6	1.683	7.094	82.518			
R7	1.502	6.330	88.849			
R8	1.443	6.083	94.931			
R9	1.202	5.069	100.000			

a. When analyzing a covariance matrix, the initial eigenvalues are the same across the raw and rescaled solution.

Component Matrix[a]		
	Raw Component 1	Rescaled Component 1
R1	1.534	.742
R2	1.029	.581
R3	.848	.556
R4	.676	.467
R5	.792	.556
R6	.956	.593
R7	.953	.610
R8	.850	.530
R9	.611	.408

a. 1 component extracted.

KMO and Bartlett's Test[a]		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.804
Bartlett's Test of Sphericity	Approx. Chi-Square	517.619
	df	36
	Sig.	.000

a. Based on correlations

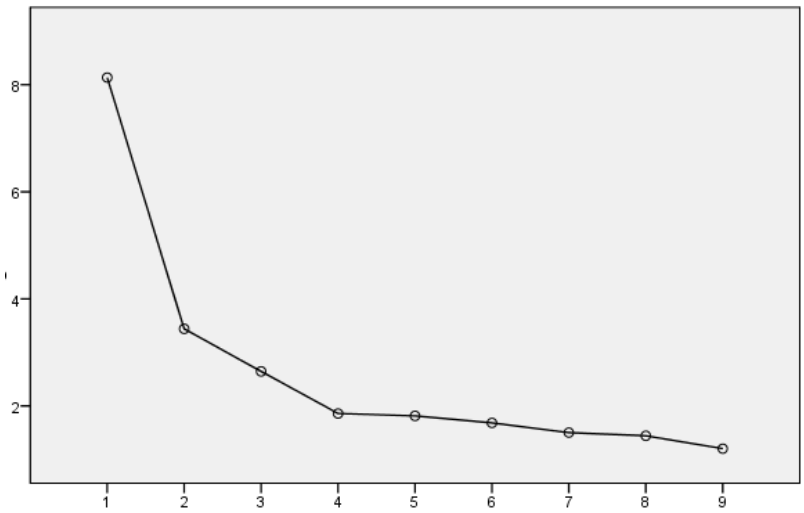


Table50 : Tables and Screen plot of Factor analysis of Results factor

3.3.2.7. Principal component analysis for teams factor

Component	Initial Eigenvalues[a]			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
T1	10.117	42.181	42.181	10.117	42.181	42.181
T2	3.264	13.608	55.789			
T3	2.443	10.187	65.976			
T4	1.909	7.960	73.936			
T5	1.805	7.526	81.461			
T6	1.435	5.982	87.443			
T7	1.260	5.253	92.697			
T8	.962	4.012	96.709			
T9	.789	3.291	100.000			

a. When analyzing a covariance matrix, the initial eigenvalues are the same across the raw and rescaled solution.

Component Matrix[a]		
	Raw Component 1	Rescaled Component 1
T1	1.249	.739
T2	.576	.421
T3	.742	.441
T4	1.242	.735
T5	1.003	.642
T6	1.064	.558
T7	.883	.674
T8	1.174	.728
T9	1.356	.762

a. 1 components extracted.

KMO and Bartlett's Test[a]		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.822
Bartlett's Test of Sphericity	Approx. Chi-Square	922.184
	df	36
	Sig.	.000

a. Based on correlations

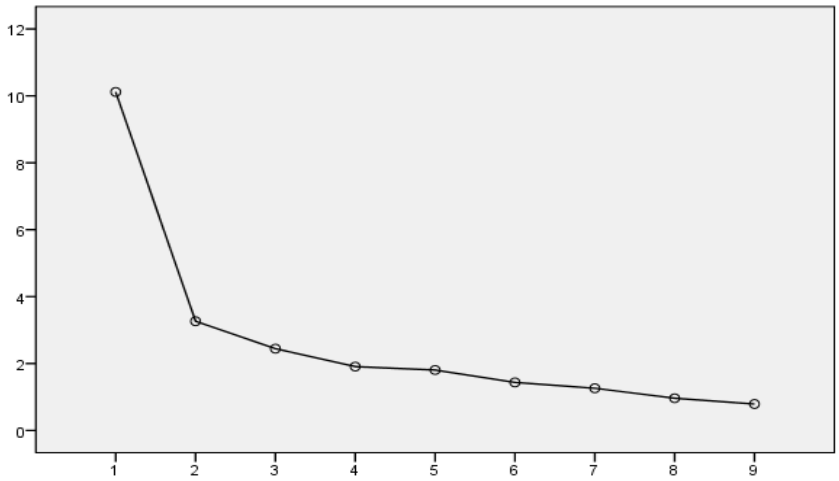


Table51 : Tables and Screen plot of Factor analysis of Teams factor

3.3.2.8. Entire Model Factor analysis

The confirmation of the model's criteria is achieved in two ways. First the importance of the criteria is evaluated in determining business performance. Second, the actual effectiveness of the criteria is analyzed using factor analysis.

To evaluate the Importance of these studies' 7 criteria's respondents of the survey were asked to rank the importance of them in last part of the questionnaire. Also analysis on the results of each shows an above average rating of importance for all criteria and close to maximum rating for many of them. Teams, Leadership and ICT showed the highest relevance, among all criteria, to improving organizational business excellence.

Descriptive Statistics				
Var	Mean	Std. Deviation	Minimum	Maximum
Environment	7.01	1.522	2	10
ICT	7.75	1.800	1	10
Knowledge	7.27	1.834	1	10
Leadership	7.83	1.787	1	10
Process	7.46	1.560	1	10
Results	7.68	1.638	2	10
Teams	8.00	1.698	2	10

And now we will conduct Factor analysis of these 7 excellence criteria.

It is important to know that Confirmatory factor analysis differs than exploratory factor analysis in the postulation of a factor structure, whereas in exploratory factor analysis the factor structure is determined within the analysis (Cramer, 2003). In this study to ensure that

the items load on only one variable a preliminary "exploratory factor analysis" is conducted on SPSS, then a confirmatory factor analysis (CFA) is conducted using specialized statistical software LISREL (Linear Structural Relationships).

In the exploratory factor analysis, the method of principle component analysis was used on SPSS and the results are illustrated in table and Figure below.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.802	21.698	21.698	12.802	21.698	21.698
2	3.422	5.799	27.497			
3	3.007	5.096	32.593			
4	2.539	4.303	36.896			
5	2.078	3.522	40.417			
6	2.046	3.468	43.886			
7	1.832	3.106	46.991			
8	1.778	3.013	50.005			
9	1.669	2.828	52.833			
10	1.608	2.725	55.558			
11	1.488	2.521	58.079			
12	1.381	2.341	60.420			
13	1.312	2.224	62.644			
14	1.216	2.062	64.706			
15	1.153	1.954	66.660			
16	1.131	1.916	68.576			
17	1.116	1.892	70.468			
18	1.027	1.740	72.209			
19	.939	1.591	73.800			
20	.839	1.422	75.222			
21	.762	1.292	76.513			
22	.745	1.263	77.777			
23	.719	1.219	78.996			
24	.681	1.154	80.149			
25	.671	1.138	81.287			
26	.636	1.078	82.365			
27	.592	1.004	83.369			
28	.578	.980	84.349			
29	.551	.934	85.283			
30	.530	.899	86.182			
31	.521	.882	87.065			
32	.498	.844	87.908			
33	.463	.785	88.693			
34	.449	.761	89.455			
35	.435	.737	90.191			
36	.406	.689	90.880			
37	.389	.660	91.540			
38	.359	.609	92.149			
39	.348	.589	92.738			

40	.337	.570	93.309			
41	.326	.552	93.861			
42	.303	.514	94.375			
43	.291	.494	94.868			
44	.283	.480	95.348			
45	.256	.434	95.783			
46	.245	.415	96.198			
47	.231	.391	96.589			
48	.216	.365	96.955			
49	.210	.356	97.310			
50	.205	.347	97.657			
51	.193	.327	97.983			
52	.184	.312	98.295			
53	.175	.297	98.592			
54	.170	.289	98.881			
55	.164	.278	99.159			
56	.135	.228	99.387			
57	.126	.214	99.601			
58	.121	.205	99.806			
59	.114	.194	100.000			

Component Matrix[a]

Var	Component 1	Var	Component 1	Var	Component 1
E1	.635	L1	.396	R1	.474
E2	.414	L2	.285	R2	.314
E3	.535	L3	.589	R3	.398
E4	.374	L4	.429	R4	.237
E5	.426	L5	.369	R5	.327
E6	.488	L6	.552	R6	.313
E7	.572	L7	.542	R7	.315
E8	.530	L8	.244	R8	.486
E9	.466	L9	.393	R9	.454
P1	.358	I1	.387	T1	.584
P2	.397	I2	.505	T2	.376
P3	.420	I3	.560	T3	.587
P4	.457	I4	.461	T4	.530
P5	.505	I5	.509	T5	.493
P6	.370	I6	.499	T6	.295
P7	.632	I7	.519	T7	.559
P8	.484	I8	.512	T8	.468
K1	.292	I9	.628	T9	.597
K2	.427				
K3	.497				
K4	.439				
K5	.474				
K6	.484				

a. 1 components extracted.

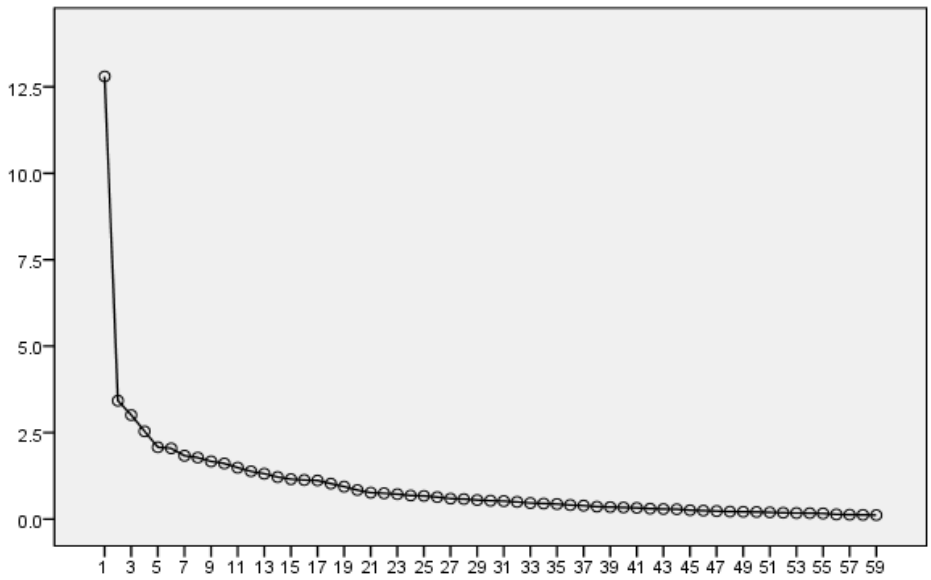


Table 52: Tables and screen plot of 59 eigen values of excellence model

The screen plot indicates a single variable to be extracted as the Eigen value of the first factor is 12.802 and the second is 3.422. The difference between both factors is rather large and the change in direction of the screen plot occurs after the first factor, thus indicating the appropriateness of extracting the first factor only. This would raise the question that despite of having a 7 different category and specifically designed statements, how CFA showed the evidence for possibility of extraction of only one factor? In section 4.3.2 we analyzed this result much broadly as this was one of the common results between studies in the excellence model's area.

The last step is to perform a confirmatory factor analysis which is used to reassure the single factor structure as expressed by the CFA Model in Figure below, where the criteria of the Construction Excellence Model are related to a latent variable that is assumed to be "excellence".

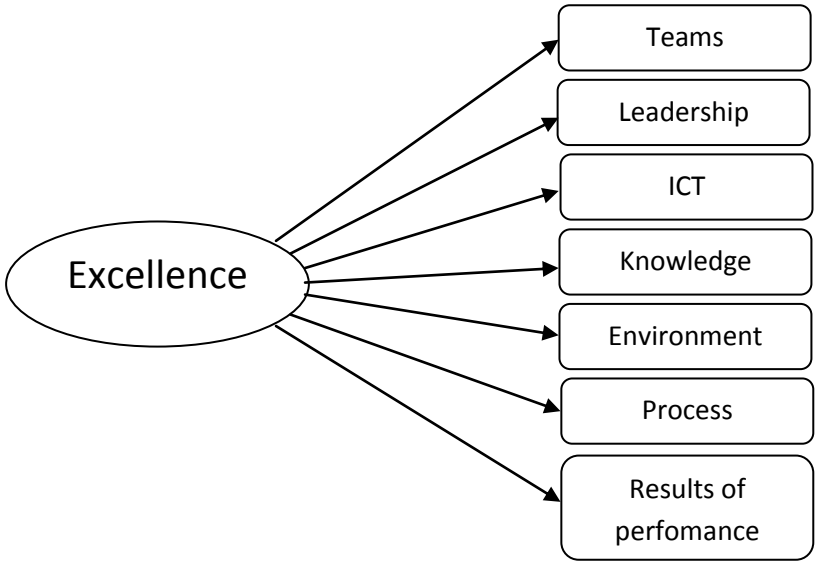


Figure41 : Conceptual model of the study

The term “latent” refers to a variable (Excellence for example) that is not directly measured or is unobserved (Loehlin, 1998, p. 1). The CFA Model is expressed in the form of a path diagram with the rectangles resembling items of the CFA Model and the latent variable portrayed as an ellipse. The arrows point from the latent variable to the items of the CFA Model indicating that it is expressed in terms of the items (Cramer, 2003). A similar manifestation of the EFQM Excellence Model as a CFA Model has been described in the literature (Eskildsen et al., 2001, p. 788).

The computations of the confirmatory factor analysis were conducted on the LISREL and IBM AMOS 22 software. IBM SPSS Amos implements the general approach to data analysis known as structural equation modeling (SEM), also known as analysis of covariance structures, or causal modeling. This approach includes, as special cases, many well- known conventional techniques, including the general linear model and common factor analysis. With Amos, we can quickly specify, view, and modify our model graphically using drawing tools. Then we can assess your model’s fit, make any modifications, and print out a publication-quality graphic of your final model.

The observed variables (Leadership, ICT, Teams, Knowledge, Environment, Process, Results) were obtained by the collecting all the results (scores) of sub-criteria into each of them. A diagram developed in the IBM AMOS 22 and the covariance matrix was prepared to analyze for the results. The appropriateness of the CFA Model is determined by goodness-of-fit indices that indicate how well the data fit the model.

A large number of indices exist in the literature and there is little agreement as to which one is appropriate (Cramer, 2003). Of these indices, the root mean squared error of approximation (RMSEA) is gaining popularity (Loehlin, 1998, p. 76) and is considered the only index to satisfy the ideal properties described by Gerbing and Anderson (1992) of indicating the degree of fit along a continuum with bounded values; being independent of sample size; and having known distributional characteristics.

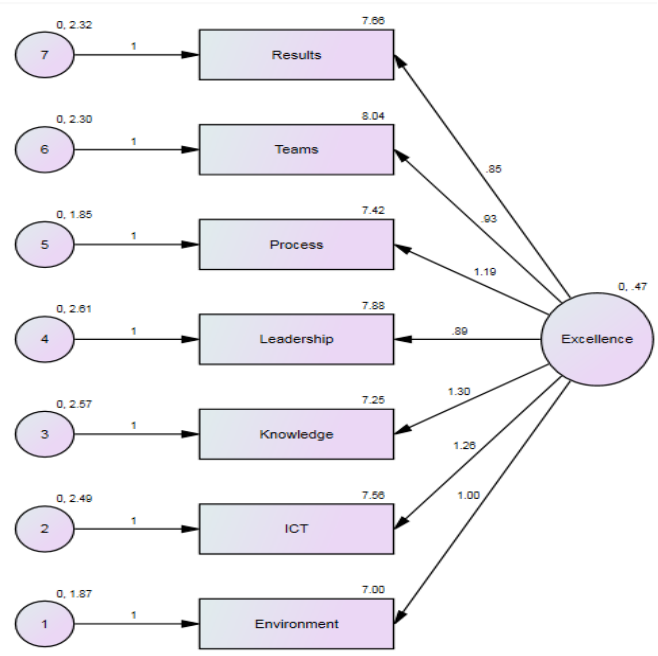


Figure 42 : study Model in IBM AMOS software

The chi-square value of measurement model was 52.793 (DF=14), comparative fit index (CFI) =.973, incremental fit index (IFI) =.973, and root mean square (RMSEA) =.030. This indicates a good fit since it is below the acceptable threshold of 0.1 (Cramer, 2003, p. 34; Loehlin, 1998, p. 77). Therefore, the empirical data confirm the CFA model in Figure above, which illustrates the expression of the latent variable "excellence" in terms of the model criteria.

3.4. Secondary Study Questions

To get the answer for the secondary questions of the study, we used T-test and Fridman test. First, in the following 7 sections we are going to use T-test. A t-test is any statistical hypothesis test in which the test statistic follows a distribution if the null hypothesis is supported. It can be used to determine if two sets of data are significantly different from each other, and is most commonly applied when the test statistic would follow a normal distribution if the value of a scaling term in the test statistic were known.

We decided to choose 5 as the indicator value of the T-test. This was because in our 10 likert scale, each statement that scored more than 5 could be interpreted to be so important in productivity of a VO. If T-test result was not meaningful, then there is no significant difference between groups. Here are this study's secondary questions:

3.4.1. Dose leadership has effectiveness in VO Excellence?

We used independent T-test to answer this question. The results (Mean and standard deviation) of survey are shown in Table which demonstrates the opinions of experts. We are examining the hypothesis H0 and H1.

H0: If the mean for this group was equal or less than 5 it means that Leadership is not an effective element in Virtual organization productivity.
H1: If the mean for this group was more than 5 it means that Leadership is an effective element in Virtual organization productivity.

$$\left.\begin{array}{l} H_0 : \mu \leq 5 \\ H_1 : \mu \succ 5 \end{array}\right\}$$

According to result significance rate was less than 0.05. This means that Leadership is an effective element in Virtual organization productivity and could be part of Excellence model.

Variable	N	Mean	Std. Error Mean	Std. Deviation
Leadership	3168	7.88	1.726	0.031

Variable	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Leadership Effectiveness	159.043	3167	.000	4.876	4.82	4.94

Table 53 : Mean and standard deviation of all the factors representing Leadership in VO

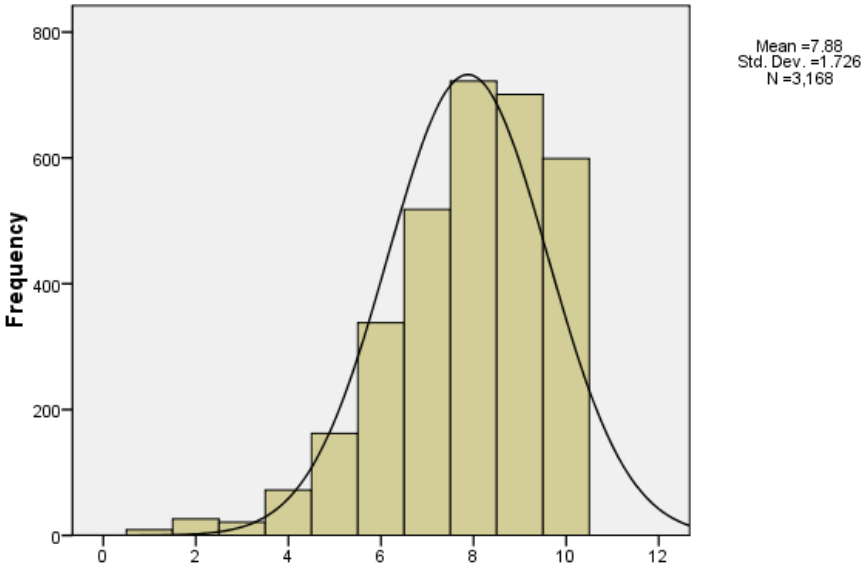


Figure 43: Normal Distribution of Leadership factor

Table below shows that results of Friedman test on 9 Leadership questions and ranking the results to see which one was indicated the most important by experts.

Descriptive Statistics					
Var	**N**	**Mean**	**Std. Deviation**	**Minimum**	**Maximum**
L1	352	8.30	1.598	1	10
L2	352	7.67	1.776	1	10
L3	352	6.93	2.193	1	10
L4	352	7.89	1.634	3	10
L5	352	7.71	1.570	4	10
L6	352	8.07	1.528	3	10
L7	352	7.97	1.626	2	10
L8	352	8.32	1.591	2	10
L9	352	8.02	1.517	4	10

Table 54: Descriptive Statistics of Leadership factor

Test Statistics of Friedman test			
N	Chi-Square	df	Asymp. Sig.
352	217.719	8	.000

Table 55: Test Statistics of Friedman test for Leadership factor

	Statements	Mean Rank
L1	Leader creates clear strategy, policy, mission, values, goals, objectives, culture, behaviors, performance metrics, and VO governance principles, quality improvement rules, based on the present and future expectations of all stakeholders. Leader also should review and update them periodically	5.91
L8	VO Leader is more a coach and moderators of functions, they are sensitive to member's schedule, gets to know them, have one-to-one contact with all members to build relationships, inspire them to have a positive competition, using effective and suitable motivation methods to build trust.	5.87
L9	Leaders relate to members at their own levels, appreciates their opinions and suggestions, care about their problems, expresses a personal interest in them, maintain a consistent trust, providing feedback.	5.33
L7	Leaders clearly defined job descriptions, performance appraisal, career development, compensation, flexible work arrangements, recruitment, training, professional skills development, benefits and compensation, ensuring legal compliance according to VO's policy and strategy.	5.21
L6	Leaders clarify communication protocols (what, to whom, when, and how), supervise and give feedback.	5.16
L4	Leaders handling all interactions with suppliers, partners, competitors and society including finding, negotiating and e-contracting (information, pre-contractual, contracting, and enactment phases).	4.77
L2	Leaders participating, supervising, supporting and giving feedback about continuous excellence improvement processes based on content of ICT framework.	4.66
L5	Leader clearly determining VO's structure, business/collaboration process modeling, access levels (assets/resources, intellectual property, etc.) for each position using best potentials in ICT framework.	4.45
L3	Leader chose the most appropriate and suitable ICT framework for VO.	3.63

Table 56: Leadership importance means per question

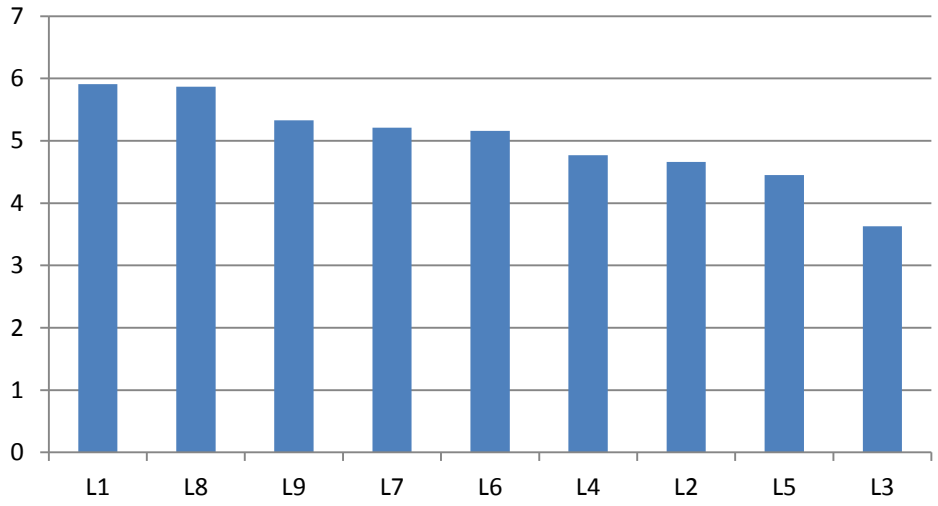


Figure 44: Ranking diagram of Leadership questions

3.4.2. Does Team has effectiveness in VO Excellence

All the tests conducted again for this question like independent T-test. The results (Mean and standard deviation) of survey are shown in Table which demonstrates the opinions of experts. We are examining the hypothesis H0 and H1.

H0: If the mean for this group was equal or less than 5 it means that teams is not an effective element in Virtual organization productivity.

H1: If the mean for this group was more than 5 it means that teams an effective element in Virtual organization productivity.

$$\left.\begin{array}{l} H_0 : \mu \leq 5 \\ H_1 : \mu \succ 5 \end{array}\right\}$$

According to result significance rate was less than 0.05. This means that Teams is an effective element in Virtual organization productivity and could be part of Excellence model.

Variable	N	Mean	Std. Error Mean	Std. Deviation
Teams	3168	8.04	1.644	.029

Variable	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Teams Effectiveness	172.456	3167	.000	5.037	4.98	5.09

Table 57: Mean and standard deviation of Team factors in questionnaire

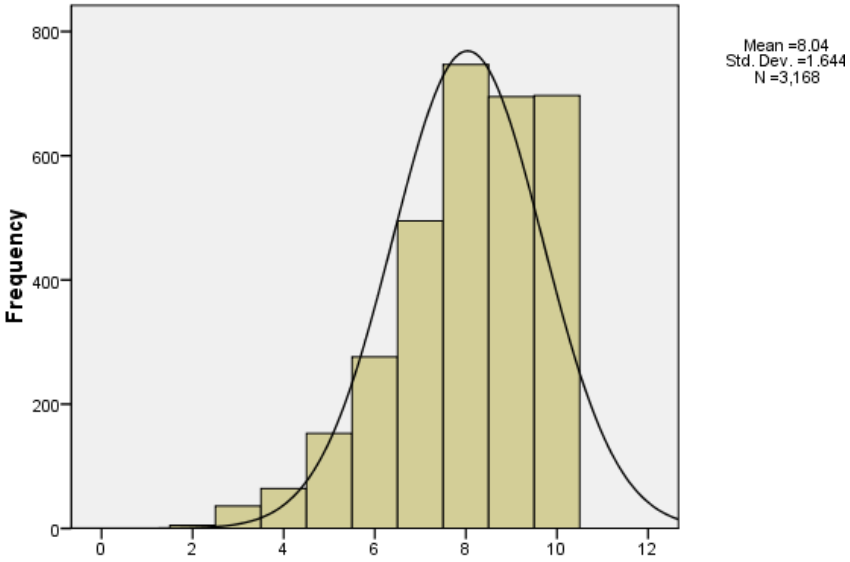


Figure 45: Normal Distribution of Leadership factor

Table below shows that results of Friedman test on 9 team's questions and ranking the results to see which one was indicated the most important by experts.

Var	N	Mean	Std. Deviation	Minimum	Maximum
T1	352	8.09	1.691	3	10
T2	352	7.90	1.368	4	10
T3	352	7.79	1.684	2	10
T4	352	8.02	1.689	3	10
T5	352	8.34	1.563	2	10
T6	352	7.84	1.907	3	10
T7	352	8.24	1.310	3	10
T8	352	8.11	1.613	3	10
T9	352	8.02	1.780	3	10

Table 58: Descriptive Statistics of Teams factor

Test Statistics of Friedman			
N	Chi-Square	df	Asymp. Sig.
352	47.699	8	.000

Table 59: Test Statistics of Friedman test for Teams factor

NO	Statements	Mean Rank
T5	Creating a united team spirit & belonging which prevents isolation and detachment with providing feedback to leader and other members about their performance using communication tools like text, chat, email and collaborative software systems, videoconferencing, preparing face-to-face meeting, voicemail messages.	5.51
T8	Having communication, awareness, and sensitivity between members despite cultural differences, understanding how cultural perspectives influence work and collaboration, and adjusting communication approach based on those differences, when appropriate.	5.33
T7	VO members must have ability to analyze, manage data, plan, and organize self work to correspond to team schedules, report progress and problems, monitor and control costs, take actions to get back on track, document and share learning.	5.24
T9	Having self management skills like: ability to establish personal and professional priorities and goals, recognizing opportunities for individual learning and growth, taking the initiative to change working methods and processes, social adequacies. Being adaptable, plan-ahead, well organized, flexible, low levels of neuroticism, resilient, extroverted, self-confident, and open to new experiences highly self-motivated, developing plans to meet those goals, executing plans, multi-tasking, influential, strong sense of urgency and drive.	5.04
T1	Having an interactive relationship between employees and leaders makes possible to have clear understanding of role, see that their opinions are taken into account when defining organizational objectives, and they are involved in decision making and setting goals collectively.	4.98
T4	Creating stable trust that means internalization of VO norms and practices and willingness to cooperate, share, and give feed back to others despite of high turnover of VO members	4.90
T6	Create a unique VO culture beyond gender, age, ethnic background, personal tastes or preferences, language, theoretical framework, history, individual assumptions, values, biases, goals, styles.	4.85
T2	A powerful reward system structure in which people are rewarded, recognized and cared for their achievements at work based on: meeting customer's and the organization's objective, skill-based criteria, learn the necessary new skills.	4.69
T3	Creating a special training (just-in-time learning) rules and motivations like: self managing skills, intercultural communication and meeting, trust building, project management skills, ICT framework training, language and balance between Technical and Interpersonal Skills, based on each position competences	4.46

Table 60: Team importance means per question

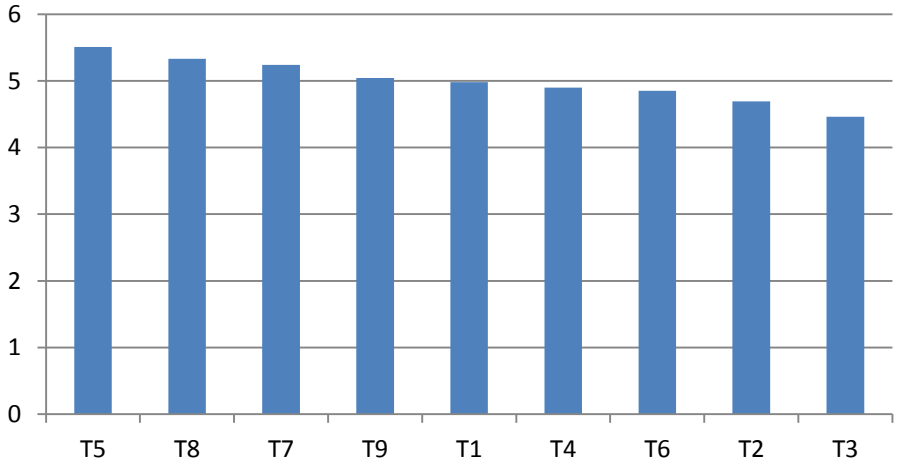


Figure 46 : Ranking diagram of Teams questions

3.4.3. Dose Knowledge has effectiveness in VO Excellence

To analyze responses and answer this question in this area we also used independent T-test. The results (Mean and standard deviation) of survey are shown in Table which demonstrates the opinions of experts. We are examining the hypothesis H0 and H1.

H0: If the mean for this group was equal or less than 5 it means that Knowledge is not an effective element in Virtual organization productivity.
H1: If the mean for this group was more than 5 it means that Knowledge is an effective element in Virtual organization productivity.

$$\left.\begin{array}{l} H_0 : \mu \leq 5 \\ H_1 : \mu \succ 5 \end{array}\right\}$$

According to result significance rate was less than 0.05. This means that Knowledge is an effective element in Virtual organization productivity and could be part of Excellence model.

Variable	N	Mean	Std. Error Mean	Std. Deviation
Knowledge	2112	7.27	1.834	.040

Variable	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Knowledge Effectiveness	107.080	2111	.000	4.274	4.20	4.35

Table 61: Mean and standard deviation of all the factors representing Knowledge in VO

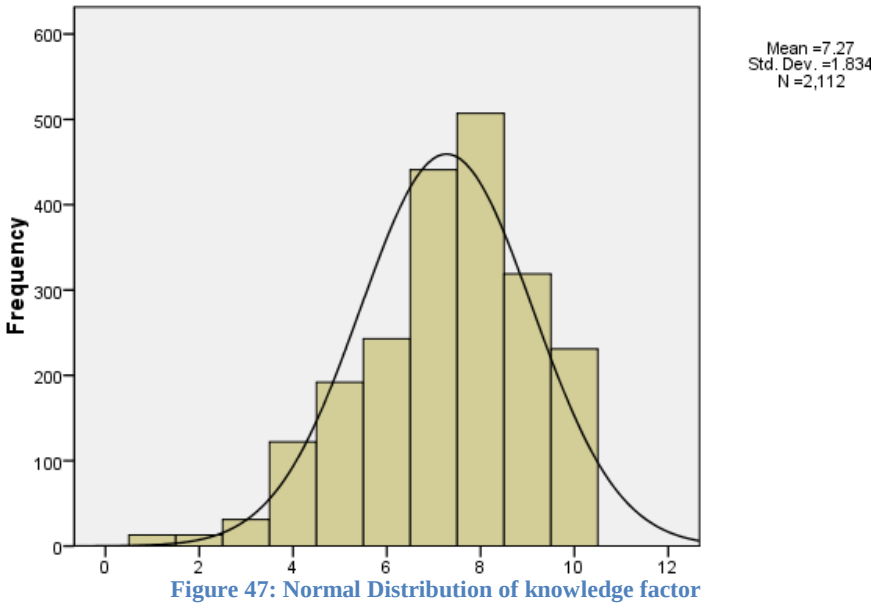


Figure 47: Normal Distribution of knowledge factor

Table below shows that results of Friedman test on 6 Knowledge questions and ranking the results to see which one was indicated the most important by experts.

Var	N	Mean	Std. Deviation	Minimum	Maximum
K1	352	8.12	1.790	1	10
K2	352	6.65	2.024	1	10
K3	352	7.54	1.383	3	10
K4	352	6.81	1.784	1	10
K5	352	7.33	1.599	1	10
K6	352	7.20	1.965	2	10

Table 62: Descriptive Statistics of Knowledge factor

Test Statistics of Friedman test			
N	Chi-Square	df	Asymp. Sig.
352	201.555	5	.000

Table 63: Test Statistics of Friedman test for Knowledge factor

NO	Statements	Mean Rank
K1	Identify and input data from projects, communications, environment, staff experience, feedback, share recourses (like calendars), teams, customers, suppliers, competitors, standards, lessons learned, benchmarking, suggestions, innovations , scientific documents, ...	4.52
K3	All members are part of creating knowledge; They use recent data and reflect the results after finalizing the projects. These new data get identified and categorized for future improvement	3.70
K5	Enrich data and knowledge by making it a must to use and share data by any individual or group	3.49
K6	Creating a transparent VO which each member can "see" and "feel" what is happening above and around.	3.46
K4	Assign each VO member a level or permission that shows who can access what in knowledge database.	3.03
K2	Data categorization are reviewed to prevent any redundancy and share openly via all channels inside VO.	2.81

Table 64: Knowledge importance means per question

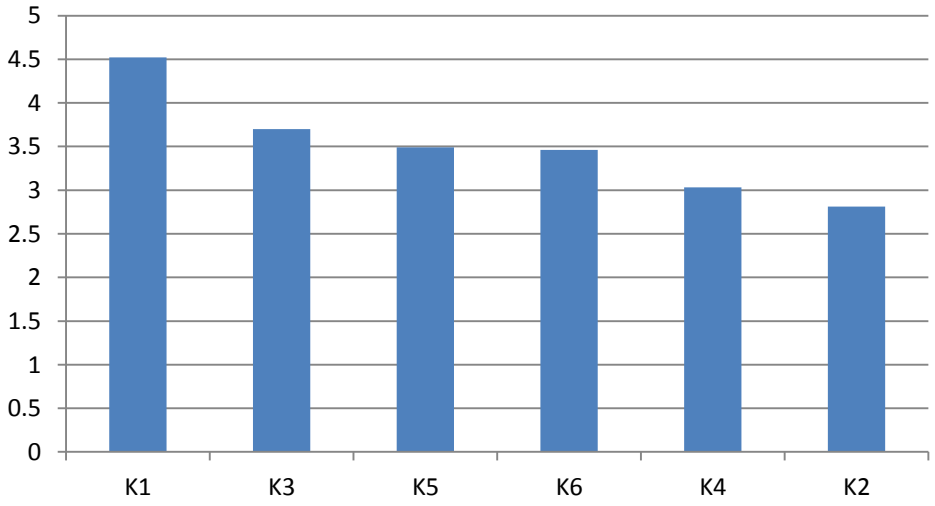


Figure 48: Ranking diagram of Knowledge questions

3.4.4. Dose ICT framework has effectiveness in VO Excellence

We used independent T-test to answer this question. The results (Mean and standard deviation) of survey are shown in Table which demonstrates the opinions of experts. We are examining the hypothesis H0 and H1.

H0: If the mean for this group was equal or less than 5 it means that ICT is not an effective element in Virtual organization productivity.

H1: If the mean for this group was more than 5 it means that ICT is an effective element in Virtual organization productivity.

$$\left.\begin{array}{l} H_0 : \mu \leq 5 \\ H_1 : \mu \succ 5 \end{array}\right\}$$

According to result significance rate was less than 0.05. This means that ICT is an effective element in Virtual organization productivity and could be part of Excellence model.

Variable	N	Mean	Std. Error Mean	Std. Deviation
ICT	3168	7.56	1.798	.032

Variable	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
ICT Effectiveness	142.870	3167	.000	4.564	4.50	4.63

Table 65 : Mean and standard deviation of all the factors representing ICT in VO

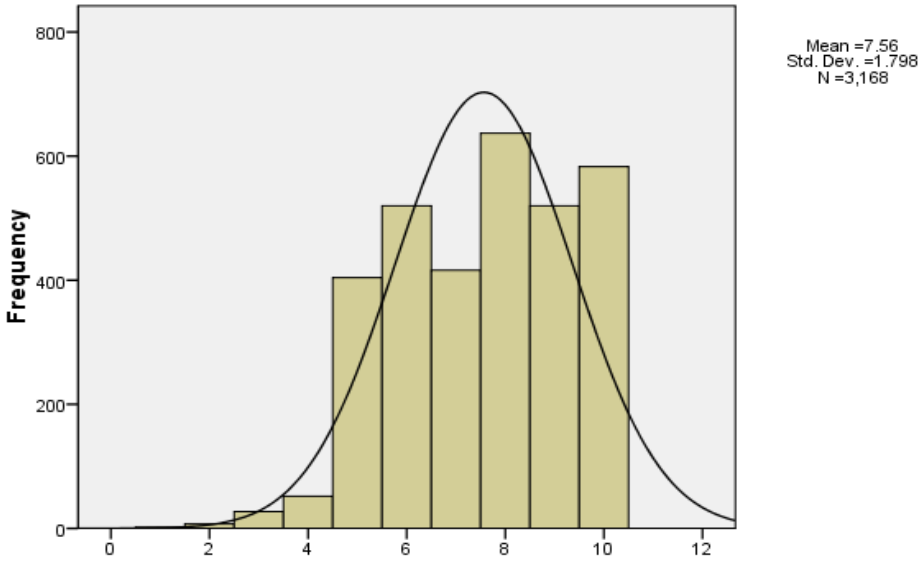


Figure 49: Normal Distribution of ICT factor

Table below shows that results of Friedman test on 9 ICT questions and ranking the results to see which one was indicated the most important by experts.

Test Statistics of Friedman test			
N	Chi-Square	df	Asymp. Sig.
352	170.492	8	.000

Table 66 : Test Statistics of Friedman test for ICT factor

Var	N	Mean	Std. Deviation	Minimum	Maximum
I1	352	8.36	1.687	1	10
I2	352	7.62	1.898	4	10
I3	352	7.60	1.818	2	10
I4	352	7.12	1.600	4	10
I5	352	8.05	1.595	4	10
I6	352	7.40	1.732	2	10
I7	352	7.25	1.698	2	10
I8	352	7.49	1.866	2	10
I9	352	7.18	1.895	3	10

Table 67: Descriptive Statistics of ICT factor

	Statements	Mean Rank
I1	Having an ICT framework providing: email, Instant Messaging, groupware/Shared Services ,web conferencing, remote access, file transfer, report generating, teleconferencing ,voice-data conversations at the same time and well graphically designed to be user-friendly like a "Real" physical space	6.27
I5	Availability of dashboard of results (financial, recourses, etc) for leader's decision making based on all input data.	5.75
I3	ICTF having cloud computing ability as SaaS (Software as a service), PaaS (Platform as a service) or IaaS (Infrastructure as a service) to decrease system errors and threats such as hardware damage, supply failure, fire, flood, etc compared to in-house server	5.07
I2	Managing, maintaining and developing the ICTF periodically (have access to 24/7 support)	4.98
I8	Providing members with the flexibility in where and when work is performed and reported trough (text, voice, and video) in ICTF.	4.85
I6	To increase quality of virtual working ICTF need to be Technology-Task-Structure fit.	4.73
I9	ICTF provides VO a high level data, information, and knowledge security in three technical, organizational, and legal dimensions.	4.51
I7	Enabling VO to get to its goal in most efficient way using less recourse in ICTF.	4.43
I4	Providing each VO member a clear identity and access level in ICTF while all actions in the system are recordable and traceable.	4.40

Table 68 : ICT importance means per question

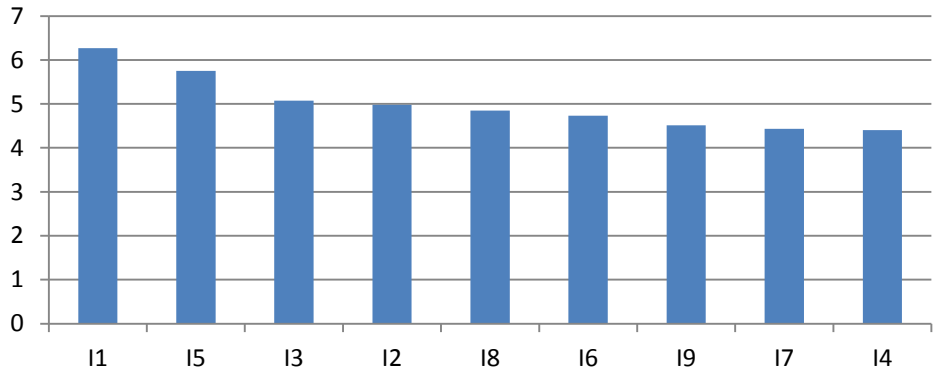


Figure 50 : Ranking diagram of ICT questions

3.4.5. Dose Process has effectiveness in VO Excellence

To Analysis results in order o find this questions answer we used independent T-test to answer this question. The results (Mean and standard deviation) of survey are shown in Table which demonstrates the opinions of experts. We are examining the hypothesis H0 and H1.

H0: If the mean for this group was equal or less than 5 it means that Process is not an effective element in Virtual organization productivity.

H1: If the mean for this group was more than 5 it means that Process is an effective element in Virtual organization productivity.

$$\left.\begin{array}{l} H_0 : \mu \leq 5 \\ H_1 : \mu \succ 5 \end{array}\right\}$$

According to result significance rate was less than 0.05. This means that Process is an effective element in Virtual organization productivity and could be part of Excellence model.

Variable	N	Mean	Std. Error Mean	Std. Deviation
Process	2816	7.42	1.586	.030

Variable	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Process Effectiveness	147.952	2815	.000	4.422	4.36	4.48

Table 69: Mean and standard deviation of all the factors representing Process in VO

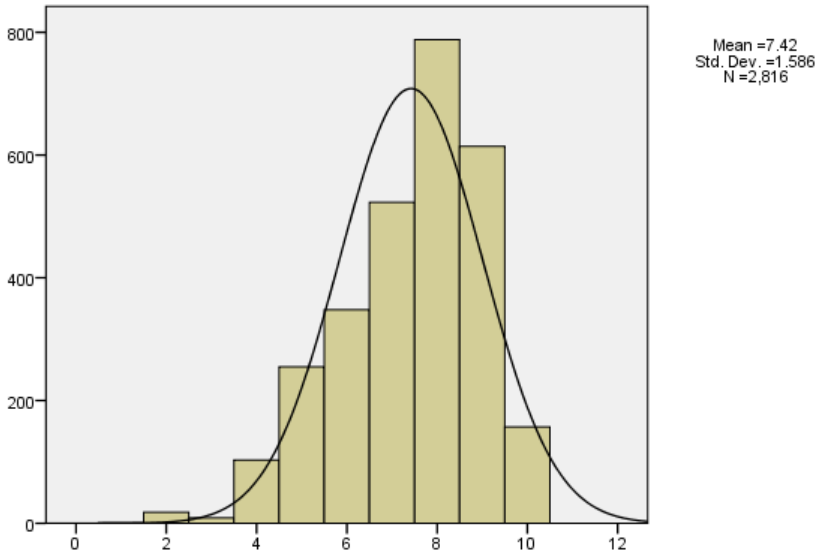


Figure 51: Normal Distribution of Process factor

Table below shows that results of Friedman test on 8 Process questions and ranking the results to see which one was indicated the most important by experts.

Var	N	Mean	Std. Deviation	Minimum	Maximum
P1	352	7.49	1.674	2	10
P2	352	7.39	1.505	2	10
P3	352	7.78	1.492	2	10
P4	352	7.45	1.535	3	10
P5	352	7.18	1.492	2	10
P6	352	7.45	1.624	1	10
P7	352	7.45	1.509	3	10
P8	352	7.18	1.766	2	10

Table 70: Descriptive Statistics of Process factor

Test Statistics of Friedman test			
N	Chi-Square	df	Asymp. Sig.
352	63.568	7	.000

Table 71 : Test Statistics of Friedman test for Process factor

	Statements	Mean Rank
P3	There are open and transparent formal communication procedures within staff, customers, and suppliers	5.10
P1	Processes designed and get managed in order to create best usage of resources, reduce staff time and costs, distribute information and knowledge, cope with location and time zone barriers, reducing and optimizing physical, economic and financial resources, find out employee opinions, and represent flatness and agility and create high degree of cohesion in VO.	4.71
P7	Customers, partners, suppliers play an important roles in VO process at different stage.	4.62
P2	Comprehensive documentation of work methods and organizational processes in all angels.	4.55
P6	Deploying policy and strategy through processes to make sure every member works toward VO's mission and objectives.	4.54
P4	Processes are being improved as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders.	4.47
P8	Placing a systems of indicators to revise changes in processes	4.09
P5	Processes are fitting Task-Technology-Structure concept of VO.	3.92

Table 72: Process importance means per question

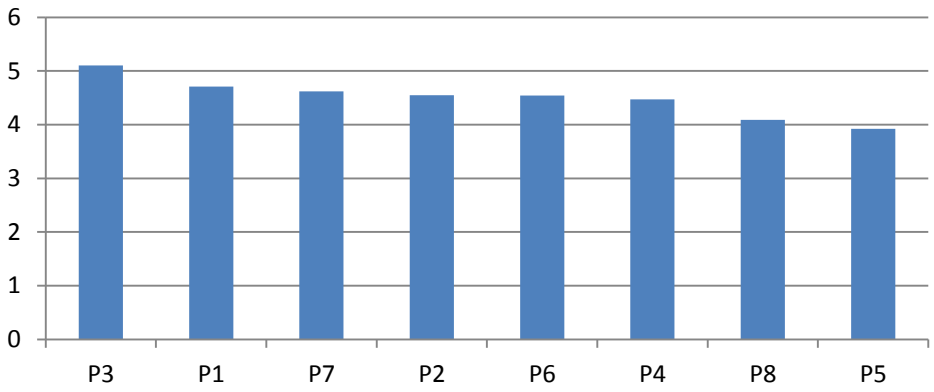


Figure 52: Ranking diagram of Process questions

3.4.6. Dose Results and feedback have effectiveness in VO Excellence

We used independent T-test to answer this question. Mean and standard deviation of survey are shown in Table which demonstrates the opinions of experts about Result variant. We are examining the hypothesis H0 and H1.

H0: If the mean for this group was equal or less than 5 it means that Results is not an effective element in Virtual organization productivity.

H1: If the mean for this group was more than 5 it means that Result is an effective element in Virtual organization productivity.

$$\left.\begin{array}{l} H_0 : \mu \leq 5 \\ H_1 : \mu \succ 5 \end{array}\right\}$$

According to result significance rate was less than 0.05. This means that Leadership is an effective element in Virtual organization productivity and could be part of Excellence model.

Variable	N	Mean	Std. Error Mean	Std. Deviation
Results	3168	7.66	1.630	.029

Variable	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Results Effectiveness	160.828	3167	.000	4.657	4.60	4.71

Table 73: Mean and standard deviation of all the factors representing Results in VO

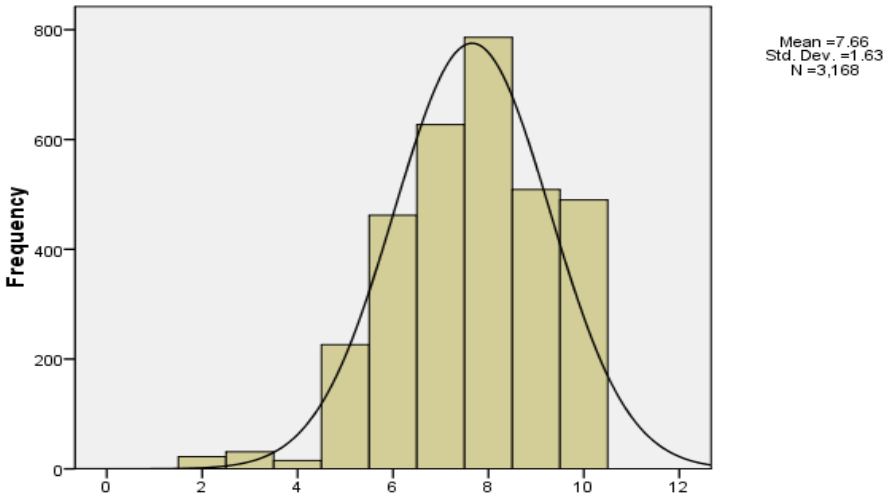


Table74 : Normal Distribution of Results factor

Table below shows that results of Friedman test on 9 Results questions and ranking the results to see which one was indicated the most important by experts.

Test Statistics of Friedman test			
N	Chi-Square	df	Asymp. Sig.
352	21.230	8	.007

Table 75 : Test Statistics of Friedman test for Process factor

Var	N	Mean	Std. Deviation	Minimum	Maximum
R1	352	7.38	2.068	2	10
R2	352	7.66	1.773	2	10
R3	352	7.60	1.525	3	10
R4	352	7.86	1.449	2	10
R5	352	7.80	1.424	5	10
R6	352	7.75	1.612	3	10
R7	352	7.72	1.561	3	10
R8	352	7.38	1.602	3	10
R9	352	7.77	1.499	3	10

Table 76: Descriptive Statistics of Process factor

	Statements	Mean Rank
R4	Checking financial results, profitability (costs versus revenue), improvement of products or services and sales per employee, market share growth.	5.25
R5	Observe any change in quality of leadership roles execution, virtual team management, coaching new team members, suggesting internal quality improvement strategies opportunities for promotion	5.18
R9	Maximizing the diversity of skills, access to a greater pool of talent optimizing the fit of individuals to teams, increase trust, quantifiable measures of evaluating individual performance on VT	5.17
R7	Any change in satisfaction indicator between members like role stressors, happy relation with their supervisors, committed to VO, levels of satisfaction with peers is important.	5.13
R6	Review environmental feedback like any change in number of customers, suppliers, partners, competitors, and their satisfaction.	5.12
R2	Checking VO's policy and strategy to see if they are helping organization to get to its ultimate goal	4.98
R1	Analyzing VO results like quality management, adherence to preset budget, lower costs, higher productivity, accuracy of financial contracts, development of new business, mission clarity.	4.82
R3	Any increase or decrease in staff turnover, degree of task flexibility, accomplishment of assigned tasks, task efficiency , commitment and involving to the work is reviewed carefully	4.71
R8	Any higher performance in production timing from order to delivery, improvement in customize product or service, decrease resources consumption, reduced staff time and costs, improve process efficiency and productivity.	4.64

Table 77: Results importance means per question

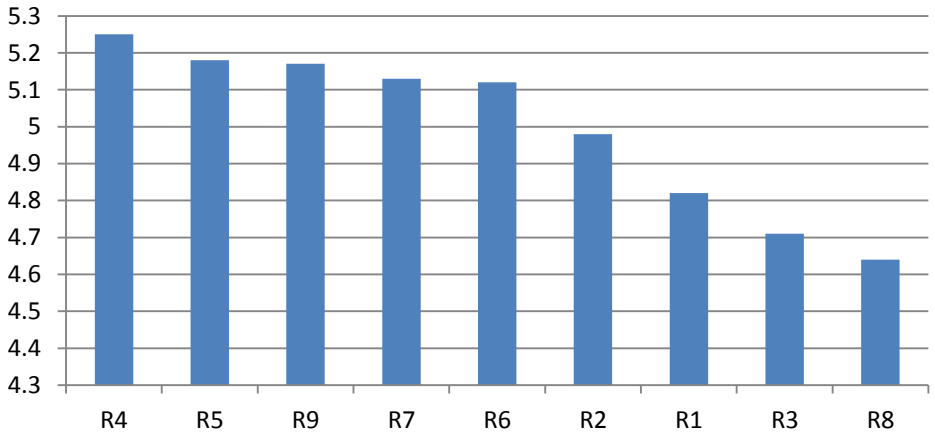


Figure 53: Ranking diagram of Results questions

3.4.7. Dose Environment has effectiveness in VO Excellence

We used independent T-test to answer this question. The results (Mean and standard deviation) of survey are shown in Table which demonstrates the opinions of experts. We are examining the hypothesis H0 and H1.

H0: If the mean for this group was equal or less than 5 it means that Environment is not an effective element in Virtual organization productivity.

H1: If the mean for this group was more than 5 it means that Environment is an effective element in Virtual organization productivity.

$$\left.\begin{array}{l} H_0 : \mu \leq 5 \\ H_1 : \mu \succ 5 \end{array}\right\}$$

According to result significance rate was less than 0.05. This means that Leadership is an effective element in Virtual organization productivity and could be part of Excellence model.

Variable	N	Mean	Std. Error Mean	Std. Deviation
Environment	3168	7.00	.027	1.531

Variable	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Environment Effectiveness	147.18	3167	.000	4.003	3.95	4.06

Table 78: Mean and standard deviation of all the factors representing Environment in VO

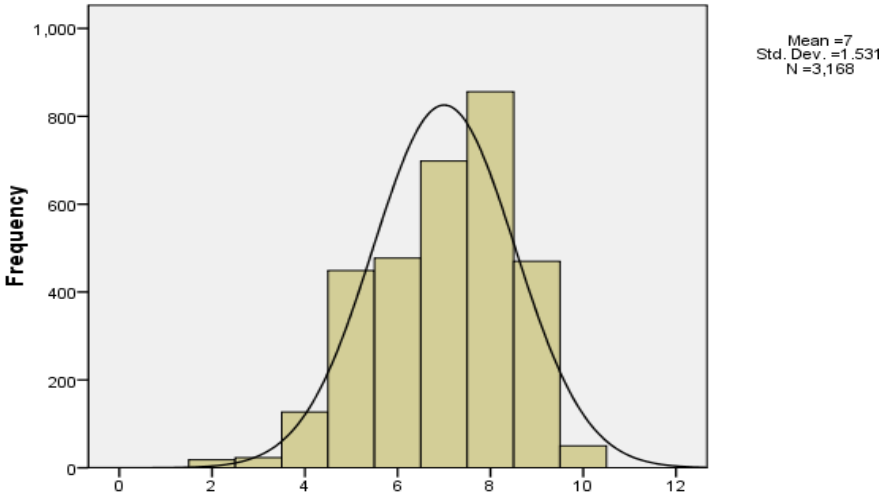


Figure 54: Normal Distribution of Environmet factor

Table blow shows that results of Friedman test on 9 Environment questions and ranking the results to see which one was indicated the most important by experts.

Test Statistics of Friedman			
N	Chi-Square	df	Asymp. Sig.
352	24.196	8	.002

Table 79 : Test Statistics of Friedman test for Environment factor

Var	N	Mean	Std. Deviation	Minimum	Maximum
E1	352	6.79	1.650	2	10
E2	352	7.11	1.450	2	10
E3	352	6.97	1.570	2	10
E4	352	6.99	1.501	3	10
E5	352	7.12	1.567	3	10
E6	352	7.08	1.411	4	10
E7	352	7.02	1.565	2	10
E8	352	6.95	1.657	2	10
E9	352	7.01	1.369	2	10

Table 80: Descriptive Statistics of Environment factor

	Statements	Mean Rank
E2	Providing VO with detailed information about market, competitors, legal and environmental issues and all the partners comments and feedbacks	5.32
E5	Analyzing market to develop new products or services ahead of competitors.	5.20
E7	VO must have common inner criteria with partners like: matching goals, algorithms, skills and capabilities, technical and economical preferences, common collaborating infrastructure and commitment to provide best quality	5.16
E4	Creating an access point for customers in VO's portal to see and comment in different phase of project.	5.04
E6	Customers get full 24/7 support after purchasing their product or service.	5.00
E9	Provide all partners or suppliers with an access point in VO's portal to share knowledge	5.00
E3	Plan customer's full experience from ordering and assigning the best team for the project to final delivery.	4.90
E8	Having common outer criteria with partners like: cost requirement, collaboration history, reliability indicators, and readiness to join the collaborative process.	4.89
E1	Comparing and revising quality of the products or service offered to customer with competitors.	4.50

Table 81 : Environment importance means per question

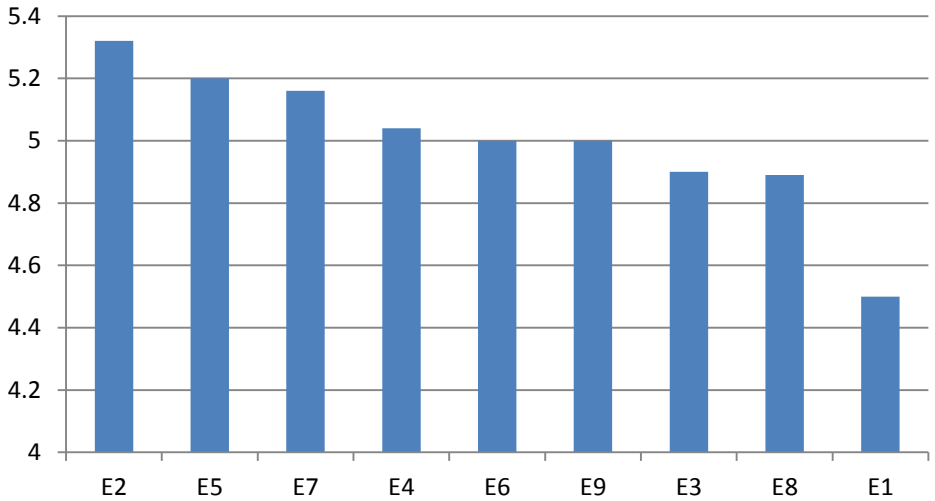


Figure 55: Ranking diagram of Environment questions

3.5. Ranking factors Question:

To Rank the Importance of factors and their contribution in business excellence, respondents of the survey were asked to rate the importance of each factor in last part of the questionnaire. The results of this question are illustrated in Table below. These results were computed on an Excel spreadsheet using its embedded functions.

Factor	*Rank#*
Leadership	1
Knowledge	2
Environment (Customers, Suppliers, competitors …)	3
Teams	4
ICT framework	5
Process	6

Table 82: Results of the question for Factors ranking

Then to see if the results of this clear question is the exact ranking that experts has in their mind we conducted an Anova Friedman test.

Friedman ANOVA test: The Friedman test is a non-parametric statistical test developed by the U.S. economist Milton Friedman. There are multiple types of variance analysis which are classified in different ways. In general, we use ANOVA when we have 3 or more groups to compare.

Result of this test showed that there is a slightly difference between result of factor ranking in questionnaire and the result of Anova Friedman test. Table below indicates the existing ranking between factors in the questionnaire results with very well significant of .000. These tables show an above average rating of importance for all criteria and close to maximum rating for many of them. Leadership, teams and ICT showed the highest relevance, among all criteria, to improving organizational Excellence and performance.

Descriptive Statistics				
Var	Mean	Std. Deviation	Minimum	Maximum
Environment	7.01	1.522	2	10
ICT	7.75	1.800	1	10
Knowledge	7.27	1.834	1	10
Leadership	7.83	1.787	1	10
Process	7.46	1.560	1	10
Results	7.68	1.638	2	10
Teams	8.00	1.698	2	10

Ranks	
Var	Mean Rank
Leadership	4.36
Teams	4.51
ICT	4.29
Results	4.10
Process	3.87
Knowledge	3.62
Environment	3.25

Test Statistics of Friedman Test			
N	Chi-Square	df	Asymp. Sig.
2112	617.715	6	**.000**

Table 83 : Friedman Test's descriptive statistics and test details

3.6. Analyzing possibility of relations between demographic aspects and main factors

Table Below is the output for the 35 different one-way ANOVA test to compare hypothetical relation between means of different demographic factors and main Excellence factors. The one-way analysis of variance (ANOVA) is used to determine whether there are any significant differences between the means of independent (unrelated) groups. In this study to investigate these possible relations, it is certainly legitimate to do an ANOVA with this size sample.

Factors \ Demographic Groups		Gender (Female, Male)	Age group (Up to 25,25-35 ,35-45 ,45-55 ,Over 55)	Scale of Organization (Local, National ,International)	Level of Virtuality (Traditional Organization, VO ,Hybrid)	Position (Leader, Manager or Director, Project manager, Team member)
Environment	HVP	.965	.724	.839	.818	.210
	ATP	.588	.846	.209	.876	.083
Leadership	HVP	.088 A	.401	.972	.897	.050 C
	ATP	.011	.151	.249	.270	.017
ICT	HVP	.563 B	.598	.965	.538	.731
	ATP	.053	.258	.658	.765	.608
Knowledge	HVP	.844	.977	.856	.499	.969
	ATP	.103	.886	.240	.441	.485
Process	HVP	.254	.034	.281	.398	.759
	ATP	.090	.136	.888	.855	.409
Result	HVP	.190	.410	.795	.896	.857
	ATP	.974	.878	.127	.521	.769
Teams	HVP	.345	.246	.277	.831	.088
	ATP	.398	.450	.263	.485	.198

HVP: Homogeneity of Variances P-value , ATP: ANOVA Test P-value

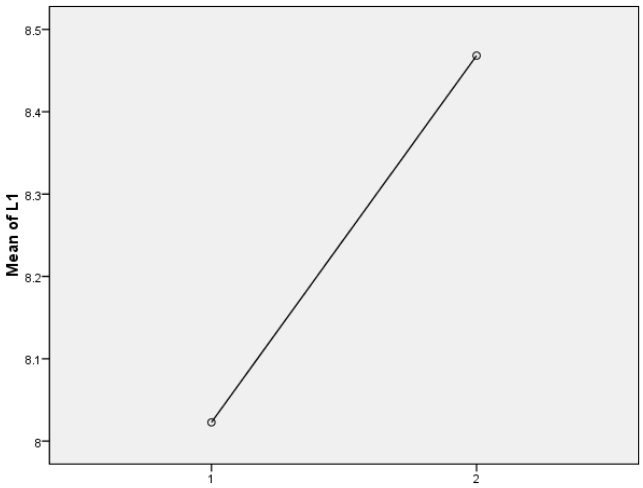
Table84 : Results for the one-way ANOVA, testing hypothetical relation of demographic factors and Excellence factors

If, the one-way ANOVA returns a significant result (ATP), we accept these groups are significantly different from each other. And in this case except of 3 tests (A,B,C) others do not show significantly difference.

3.6.1. Importance for Leadership and Gender

A: Leadership importance differed significantly among 2 gender groups. In this test HVP was 0.88 and ATP was reported 0.011 which was so among the accepting level.

Leadership	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	132	8.02	1.793	.156	7.71	8.33	1	10
2	220	8.47	1.447	.098	8.28	8.66	1	10
Total	352	8.30	1.598	.085	8.13	8.47	1	10



Test of Homogeneity of Variances			
Levene Statistic	df1	df2	Sig.
2.928	1	350	.088

ANOVA					
L1	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.370	1	16.370	6.513	.011
Within Groups	879.709	350	2.513		
Total	896.080	351			

Table 85 : Results of ANOVA test and Test of Homogeneity of Variances to find a relation between Leadership and Gender

Male experts gave more importance to leadership factor in excellence model (M = 8.47) and less importance have been given to leadership in excellence model (M = 8.02) by females. Normally in this situation a Post hoc test will be conducted but this test are not performed for Leadership factor because there are fewer than three groups.

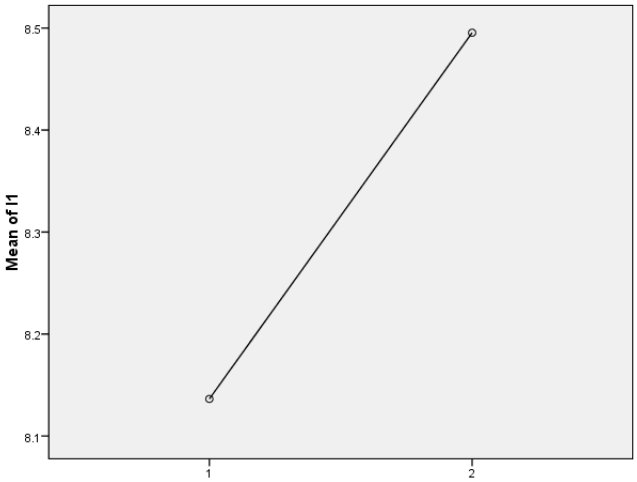
3.6.2. ICT framework and gender

B: ICT framework's importance differed significantly among 2 gender groups. In this test HVP was 0.563 and ATP was reported 0.053 which was among the accepting level.

ICT	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	132	8.14	1.819	.158	7.82	8.45	1	10
2	220	8.50	1.592	.107	8.28	8.71	5	10
Total	352	8.36	1.687	.090	8.18	8.54	1	10

Female experts gave more importance to ICT framework factor in excellence model (M = 8.50) and less importance have been given to leadership in excellence model (M = 8.14) by Male.

ANOVA					
ICT	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.638	1	10.638	3.766	.053
Within Groups	988.541	350	2.824		
Total	999.179	351			



Test of Homogeneity of Variances			
Levene Statistic	df1	df2	Sig.
.335	1	350	.563

Table 86: Results of ANOVA test and Test of Homogeneity of Variances to find a relation between ICT frameworks.

Normally in this situation Post hoc tests will be conducted but in this case this test was not performed for ICT framework factor because there are fewer than three groups.

3.6.3. Leadership and position in company

C: Leadership's importance differed significantly among 4 Position group (Leader, Manager or Director, Project manager, Team member). In this test HVP was 0.050 and ATP was reported 0.017 which was among the accepting level.

Leadership	**Test of Homogeneity of Variances**		
Levene Statistic	df1	df2	Sig.
2.627	3	348	.050

ANOVA					
L1	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	25.931	3	8.644	3.457	.017
Within Groups	870.149	348	2.500		
Total	896.080	351			

Table 87 : Results of ANOVA test and Test of Homogeneity of Variances to find a Leadership and position in company.

As the results from the one-way ANOVA do not indicate which of the three groups differ from one another, so, in many cases; it is of interest to follow the analysis with a post hoc test or a planned comparison among particular means. If several comparisons between pairs of means are made, it is a good idea to use a test, such as the Tukey, that controls for alpha inflation.

Leadership Tukey HSD		**Multiple Comparisons**				
(I) Position	(J) Position	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	.222	.189	.644	-.27	.71
	3	.625	.299	.158	-.15	1.40
	4	-.522	.299	.301	-1.29	.25
2	1	-.222	.189	.644	-.71	.27
	3	.403	.306	.552	-.39	1.19
	4	-.744	.306	.073	-1.53	.05
3	1	-.625	.299	.158	-1.40	.15
	2	-.403	.306	.552	-1.19	.39
	4	**-1.147***	**.384**	**.016**	**-2.14**	**-.16**
4	1	.522	.299	.301	-.25	1.29
	2	.744	.306	.073	-.05	1.53
	3	**1.147***	**.384**	**.016**	**.16**	**2.14**

*. The mean difference is significant at the 0.05 level.

Tukey HSD			
Position	N	Subset for alpha = 0.05	
		1	2
3	34	7.76	
2	125	8.17	8.17
1	159	8.39	8.39
4	34		8.91
Sig.		.166	.048
Means for groups in homogeneous subsets are displayed.			

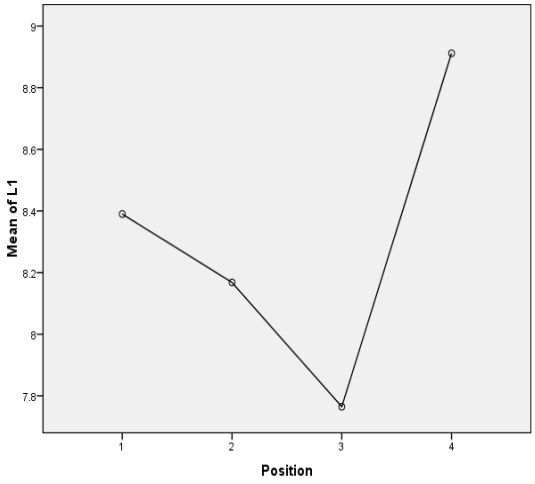


Table 88 : The results of Tukey HSD for Leadership's importance among 4 Position group (Leader, Manager or Director, Project manager, Team member).

The post hoc tests indicated that out of 4 Position group (Leader, Manager or Director, Project manager, Team member), team members differed significantly from other position and mostly from Project managers ($P < .05$). We now discuss about analysis conducted on survey results to mine the possible correlations in the model.

3.7. Model correlations and their weight

There are three software that researchers could use to conduct for structural path analysis. SPSS path Analysis, IBM AMOS and LISREL. In virtual organization excellence model's case these 3 has different potential and specific focus of interest. In SPSS the path analysis in complex models must be done by multiple steps and each time from one of the factors point of view while the other 2 has the potential to analyze the data in one step.

Besides, SPSS includes weaker graphical characteristic while 2 others have much more advance option to create graphical models. Also the focus of LISREL is on explanation and IBM AMOS is on prediction (Jöreskog & Wold, 1982). Since this study is oriented against explanation and we want to predict level and scores for correlation between our factors SPSS and IBM AMOS has been chosen as modeling approach.

The structural part of our model that we mapped in Amos involves 7 latent variables: Leadership, Teams, ICT, Knowledge, Environment, Process and Results. It is clear in the model that these variables are latent variables because they appear as ovals (Circles).The arrows show dependencies in the model. A double-curved arrow indicates that two variables co-vary. in this model we want to predict any correlation between model variables so we draw all the arrows between them.

Amos helps us to see if this model is fit for our variable and if we need to eliminate any relation or add any other correlation. Based on the results of the factor analysis section, the calculation in "model fit" results in AMOS and other scholars, our model was acceptable with, Chi-square = 7188.576, Degrees of freedom = 1631, $p<0.001$, RMSEA = 0.99, CFI: 0.44, IFI=0.44, TLI= 41 (Chi-square is so sensitive to the size of data analyzed).

The measurement part of the model depicts how the latent variables are measured by observed variables. As the arrowheads indicate, each measure is a dependent variable, dependent on its associated latent variable and an error term. The data input to the analysis in this instance is a correlation matrix based on 352 observations.

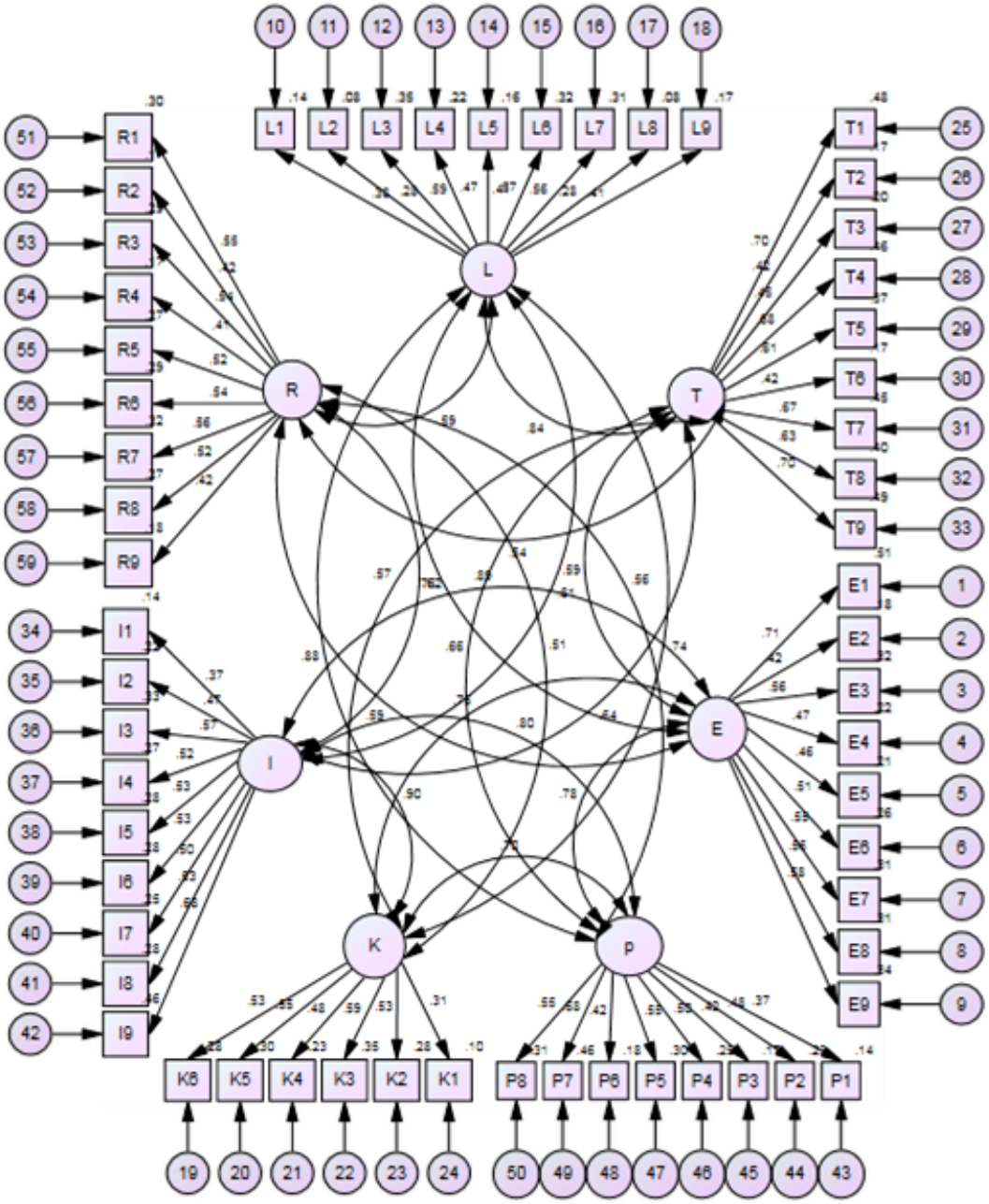


Figure 56 : Conceptual model in IBM AMOS with corelations

We expected that all the latent variables have positive impact on each other's (because of the way Statements in questionnaire designed) and any negative correlation would be raised a question of the validity of questionnaire. Here are the un-standardized covariance weights for paths in the model, along with standard errors, critical ratios, and p-values.

Relation			Estimate	S.E.	C.R.	P
L	<-->	K	.247	.062	3.963	***
L	<-->	I	.485	.092	5.273	***
L	<-->	T	.601	.105	5.729	***
E	<-->	L	.540	.097	5.591	***
E	<-->	T	.819	.117	7.022	***
E	<-->	I	1.034	.140	7.367	***
E	<-->	K	.485	.105	4.629	***
T	<-->	p	.477	.091	5.220	***
L	<-->	p	.332	.073	4.564	***
I	<-->	R	.385	.076	5.071	***
E	<-->	R	.438	.082	5.354	***
K	<-->	R	.175	.047	3.709	***
K	<-->	I	.490	.108	4.524	***
p	<-->	R	.217	.051	4.238	***
K	<-->	p	.240	.062	3.874	***
I	<-->	p	.485	.095	5.110	***
K	<-->	T	.369	.085	4.336	***
E	<-->	p	.569	.104	5.466	***
L	<-->	R	.224	.051	4.370	***
T	<-->	I	.745	.115	6.502	***
T	<-->	R	.401	.077	5.186	***

Table 89 : Un-standardized covariance weights for paths in the model

And here are the accompanying standardized regression weights.

			Estimate
L	<-->	K	.736
L	<-->	I	.811
L	<-->	T	.843
E	<-->	L	.757
E	<-->	T	.594
E	<-->	I	.895
E	<-->	K	.749
T	<-->	p	.656
E	<-->	p	.782
L	<-->	p	.883
I	<-->	R	.623

			Estimate
E	<-->	R	.595
L	<-->	R	.588
K	<-->	R	.507
K	<-->	I	.902
T	<-->	R	.544
p	<-->	R	.558
K	<-->	p	.701
I	<-->	p	.796
K	<-->	T	.568
T	<-->	I	.644

Table 90 : standardized regression weights in the model

As it is clear the dependencies between the latent variables are positive as predicted by Literature theories and survey design methodology. As it is clear all the paths coefficients are statistically significant.

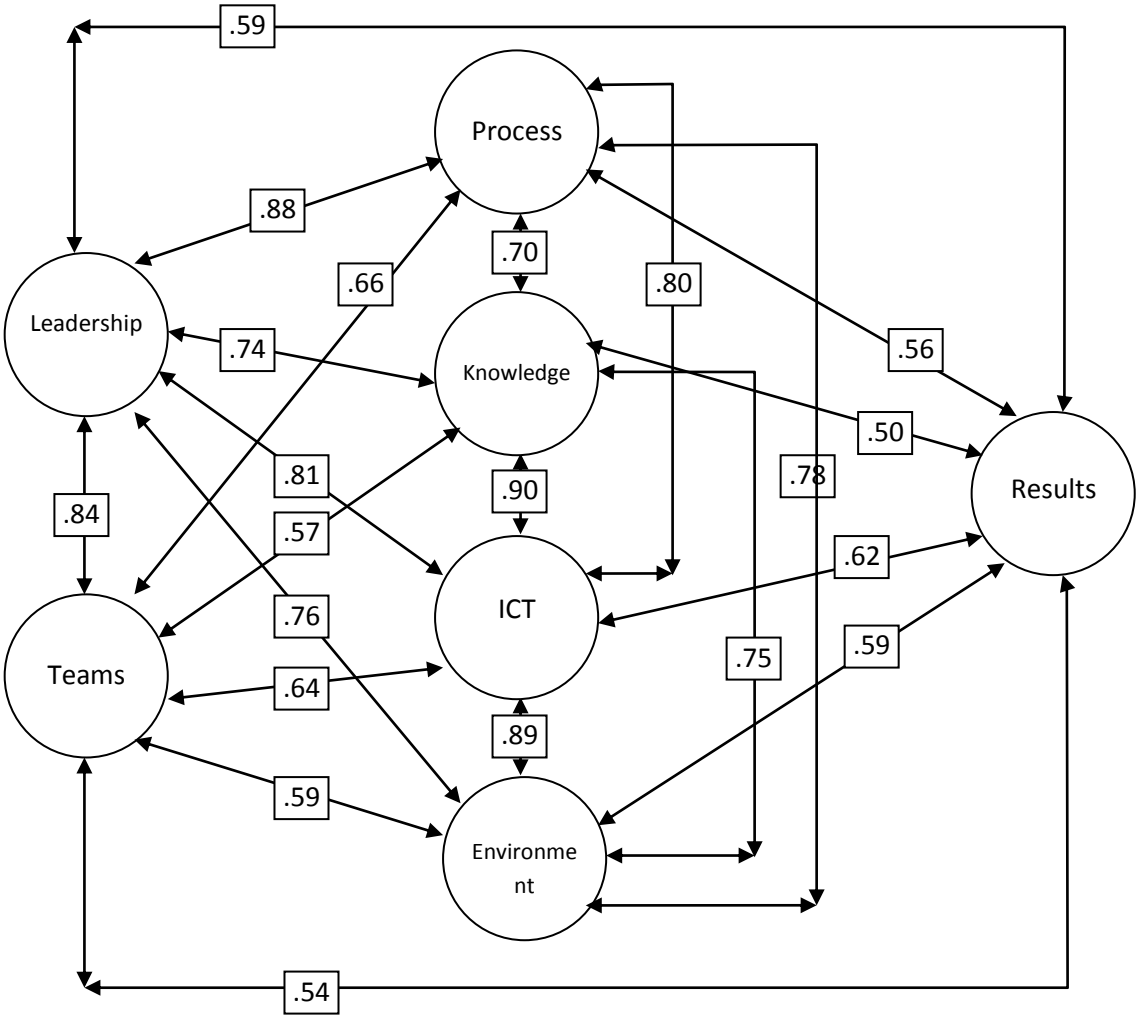


Figure 57 : Correlations weights in the proposed model

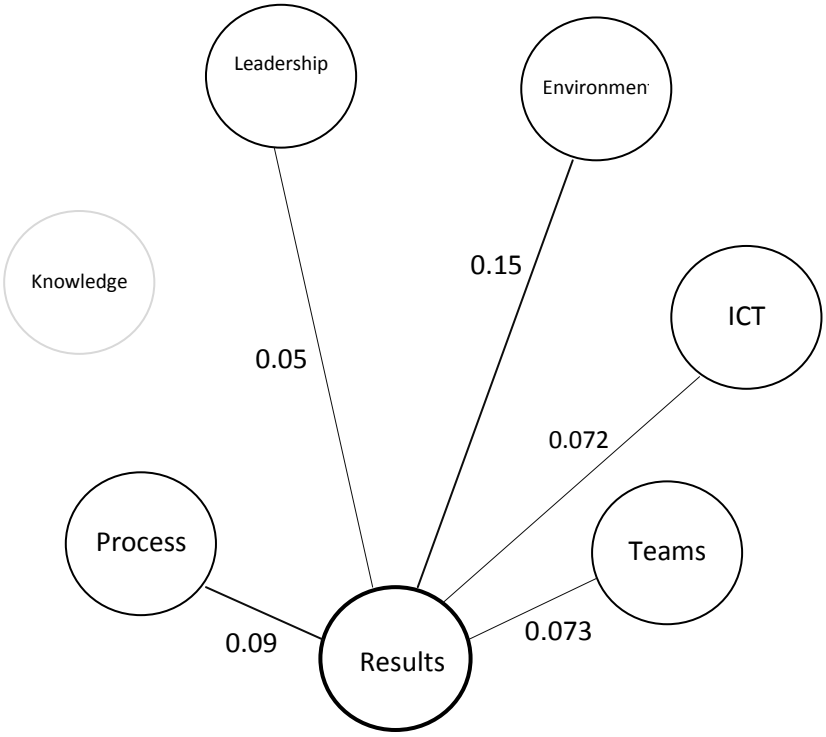
As a confirmation we conducted a second analysis to calculate the weight of model based correlation we did a step by steps path analysis by SPSS 16.0. To do this analysis we calculated the coefficient for all the variables. We started by Result factor. **STEP 1:**

Coefficients Dependent Variable: Result						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.165	.271		15.392	.000
	Environment	.165	.024	.154	6.967	.000
	ICT	.065	.021	.072	3.146	.002
	Knowledge	.021	.020	.024	1.062	.288
	Leadership	.046	.020	.050	2.295	.022
	Process	.103	.024	.098	4.345	.000
	Teams	.071	.021	.073	3.357	.001

Model Summary Dependent Variable: Result				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.285[a]	.081	.078	1.572
a. Predictors: (Constant), T, L, K, E, P, I				

Table 91: Model Summary and Coefficients - Dependent Variable: Result

According to the table above Results have strong correlation with all the factors except Knowledge as this correlation is not significant in 0.05 level.



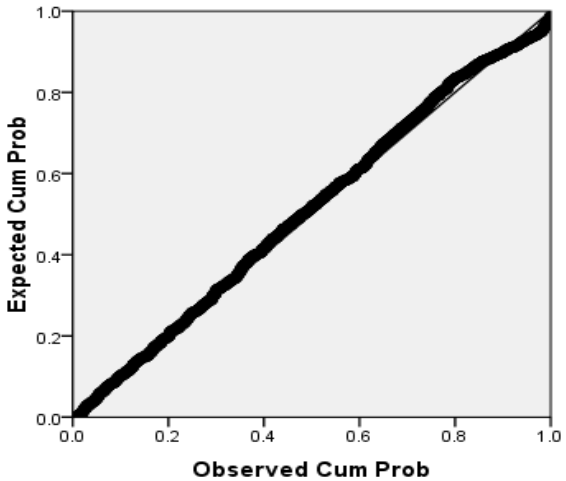


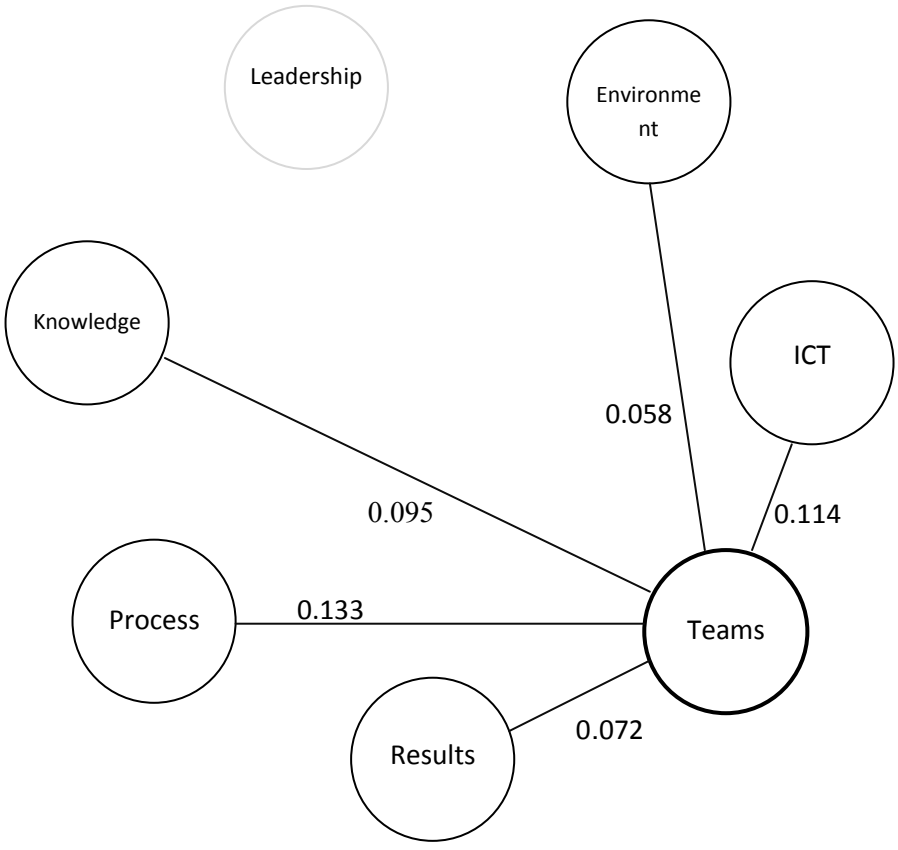
Figure 58 : Normal P-P Plat of Regression Standardized Residual - Dependent variable: Results

STEP 2: In this Analysis we calculated the coefficient of all the variables with Teams factor.

Model Summary Dependent Variable: Teams				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.306[a]	.094	.091	1.619
a. Predictors: (Constant), R, L, K, E, P, I				

Coefficients Dependent Variable: Teams						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.121	.280		14.725	.000
	Environment	.065	.025	.058	2.633	.009
	ICT	.107	.021	.114	5.057	.000
	Knowledge	.088	.021	.095	4.220	.000
	Leadership	.037	.021	.039	1.796	.073
	Process	.145	.024	.133	5.977	.000
	Result	.075	.022	.072	3.357	.001

Table 92 : Model Summary and Coefficients - Dependent Variable: Team



According to the table above, Teams have strong correlation with all the factors except Leadership as this correlation is not significant in 0.05 level.

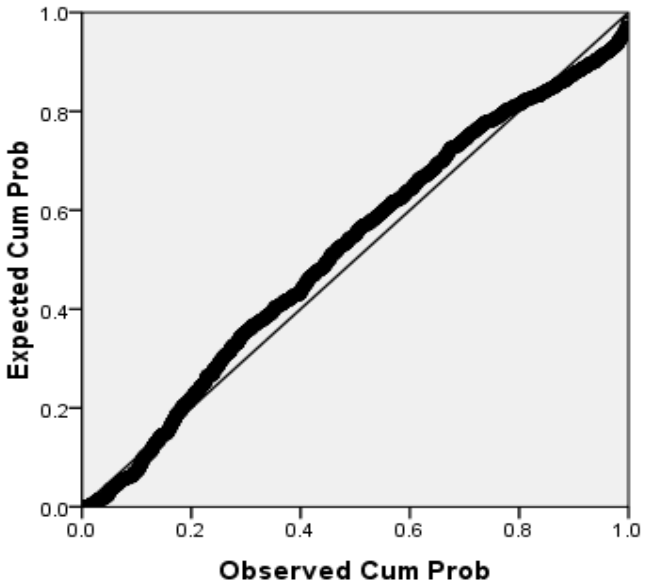


Figure 59 : Normal P-P Plat of Regression Standardized Residual - Dependent variable: Teams

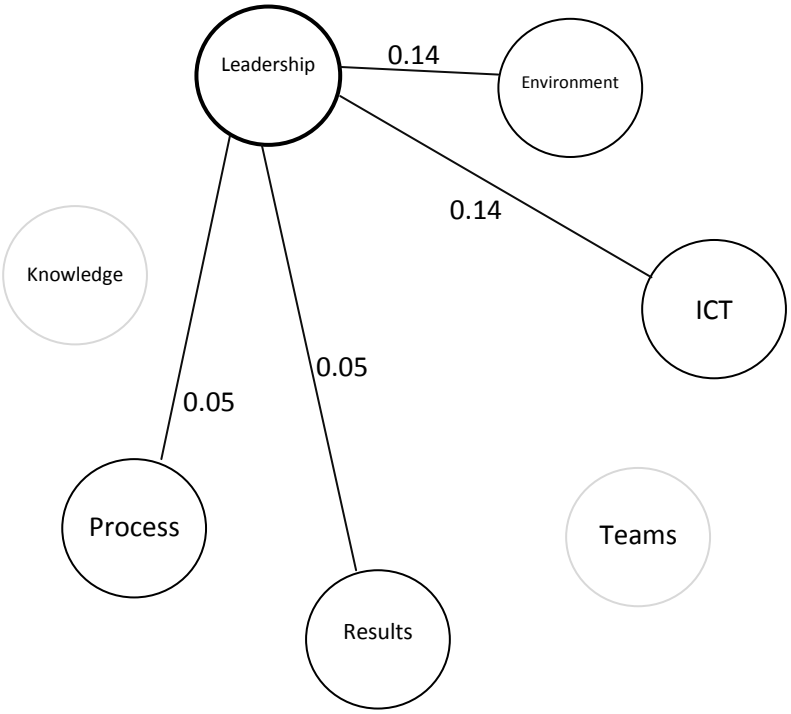
STEP 3: In this Analysis we calculated the coefficient of all the variables with Leadership factor.

Model Summary Dependent Variable: Leadership				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.281[a]	.079	.076	1.718
a. Predictors: (Constant), T, R, K, E, I, P				

Coefficients Dependent Variable: Leadership						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.197	.298		14.077	.000
	Environment	.165	.026	.140	6.337	.000
	ICT	.147	.022	.148	6.562	.000
	Knowledge	.016	.022	.017	.735	.463
	Process	.063	.026	.055	2.432	.015
	Result	.055	.024	.050	2.295	.022
	Team	.042	.023	.039	1.796	.073

Table 93 : Model Summary and Coefficients - Dependent Leadership Variable

According to the table above, Leadership have strong correlation with all the factors except Knowledge and teams, as this correlations are not significant in 0.05 level.



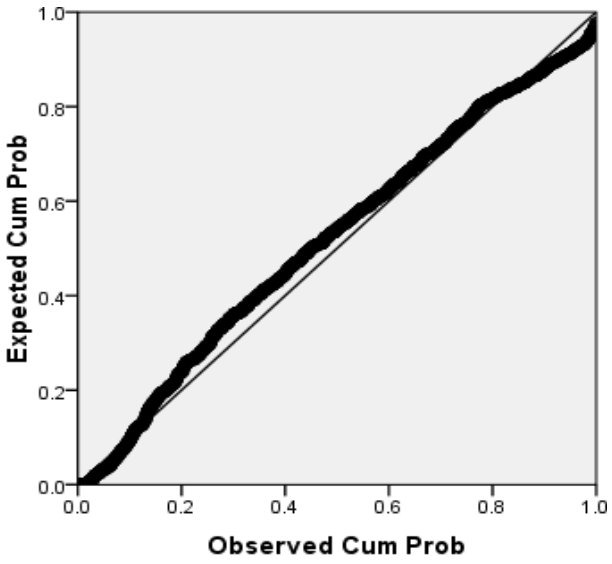


Figure 60: Normal P-P Plat of Regression Standardized Residual - Dependent variable: Leadeship

STEP 4: In this Analysis we calculated the coefficient of all the variables with Leadership factor.

Model Summary Dependent Variable: ICT				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.401[a]	.161	.158	1.651
a. Predictors: (Constant), T, L, R, K, E, P				

Coefficients Dependent Variable: ICT						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.265	.296		7.661	.000
	Environment	.070	.025	.059	2.785	.005
	Knowledge	.208	.021	.212	9.990	.000
	Leadership	.136	.021	.135	6.562	.000
	Process	.131	.025	.113	5.266	.000
	Results	.072	.023	.065	3.146	.002
	Teams	.112	.022	.105	5.057	.000

Table 94 : Model Summary and Coefficients - Dependent Leadership Variable

According to the table above, Leadership have strong correlation with all the factors because they are all significant in 0.05 level.

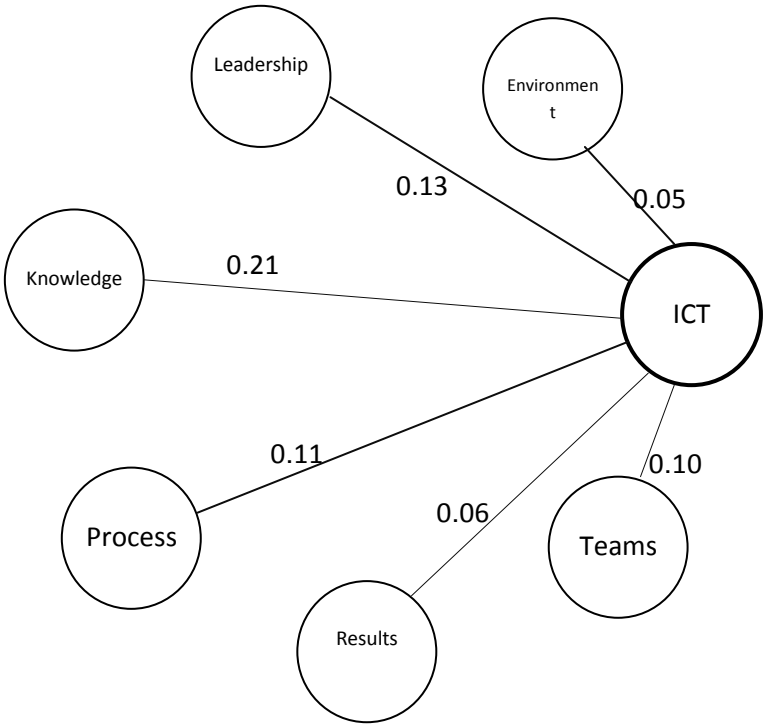


Figure 61: Correlation model diagram for ICT as a Dependent variable

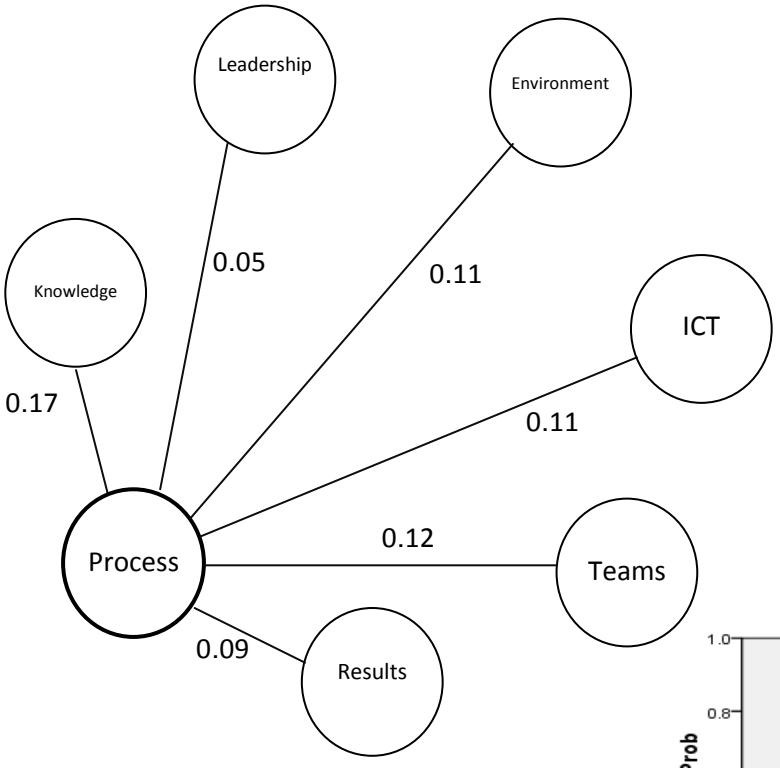
STEP 5: In this Analysis we calculated the coefficient of all the variables with Process factor.

Model Summary Dependent Variable: Process				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.389[a]	.151	.149	1.439
a. Predictors: (Constant), T, L, R, K, E, I				

Coefficients Dependent Variable: Process						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.842	.254		11.195	.000
	Environment	.120	.022	.117	5.477	.000
	ICT	.099	.019	.115	5.266	.000
	Knowledge	.149	.018	.175	8.139	.000
	Leadership	.044	.018	.051	2.432	.015
	Results	.086	.020	.091	4.345	.000
	Teams	.115	.019	.125	5.977	.000

Table 95 : Model Summary and Coefficients - Dependent Process Variable

According to the table above, Process have strong correlation with all the factors because they are all significant in 0.05 level.



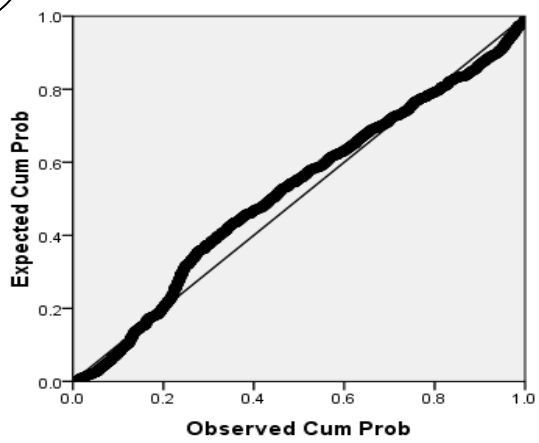


Figure 62: Normal P-P Plat of Regression Standardized Residual - Dependent variable: Leadeship

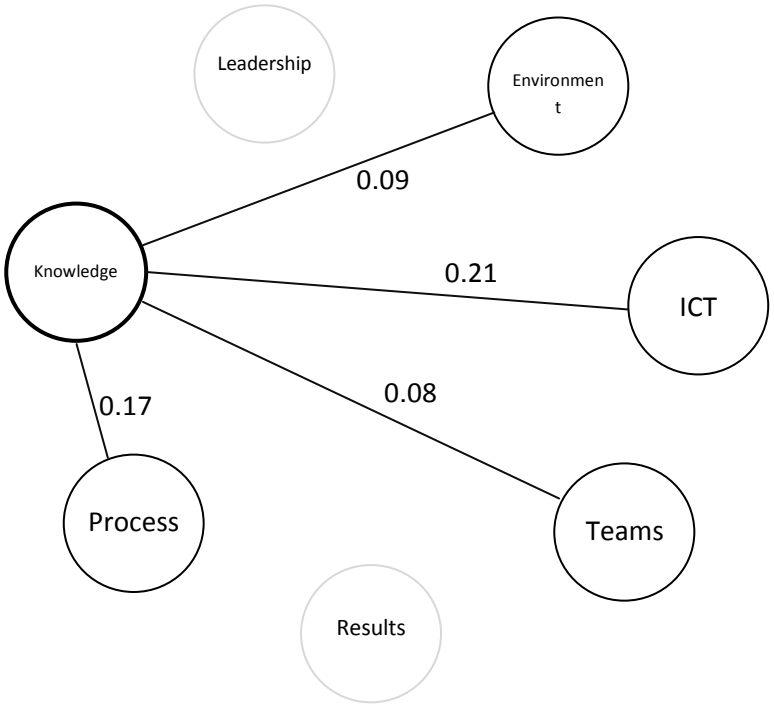
STEP 6: In this Analysis we calculated the coefficient of all the variables with Knowledge factor.

Model Summary Dependent Variable: Knowledge				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.389[a]	.151	.149	1.692
a. Predictors: (Constant), T1, L1, R1, P1, E1, I1				

Coefficients Dependent Variable: Knowledge						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.160	.304		7.112	.000
	Environment	.116	.026	.096	4.499	.000
	ICT	.218	.022	.214	9.990	.000
	Leadership	.016	.021	.015	.735	.463
	Process	.205	.025	.175	8.139	.000
	Result	.025	.023	.022	1.062	.288
	Team	.096	.023	.089	4.220	.000

Table 96: Model Summary and Coefficients - Dependent Knowledge Variable

Acording to the table above, Knowledge have strong correlation with all the factors except Leadership and Results, as this correlations are not significant in 0.05 level.



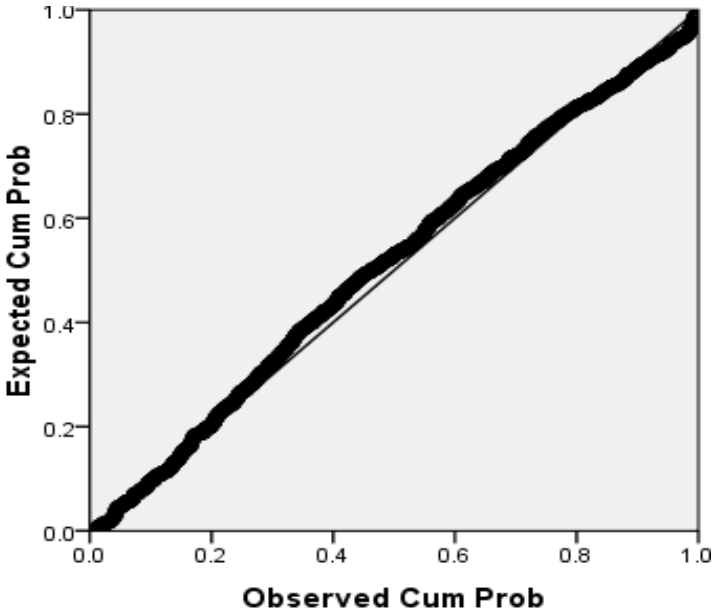


Figure 63: Normal P-P Plat of Regression Standardized Residual - Dependent variable: Process

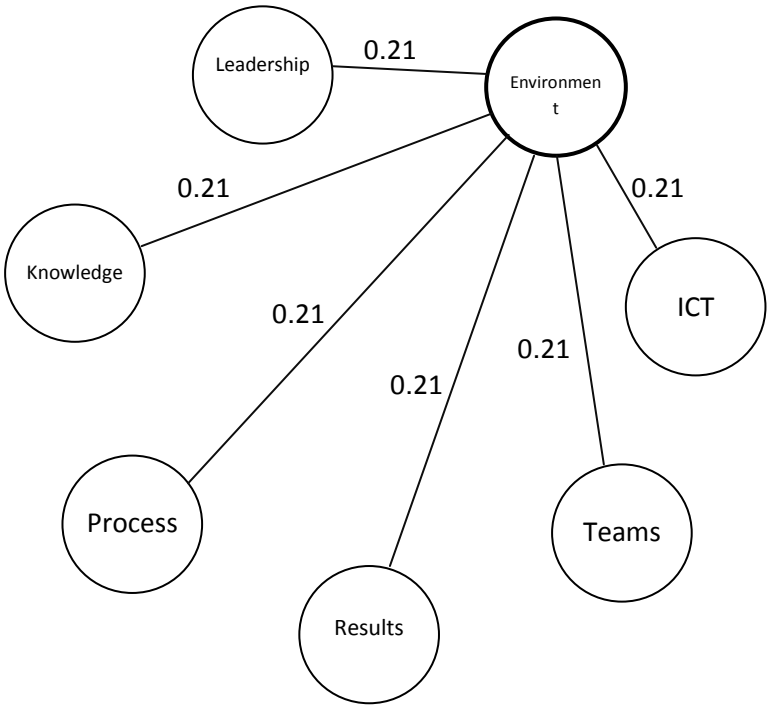
STEP 6: In this Analysis we calculated the coefficient of all the variables with Environment factor.

Model Summary Dependent Variable: Environment				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.337[a]	.113	.112	1.427
a. Predictors: (Constant), T1, L1, R1, I1, P1				

Coefficients Dependent Variable: Environment						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.011	.215		14.035	.000
	ICT	.068	.016	.080	4.277	.000
	Leadership	.104	.016	.120	6.540	.000
	Process	.137	.018	.143	7.616	.000
	Result	.123	.017	.134	7.317	.000
	Team	.089	.017	.097	5.229	.000

Table 97: Model Summary and Coefficients - Dependent Environment Variable

Acording to the table above, Environment have strong correlation with all the factors because they are all significant in 0.05 level.



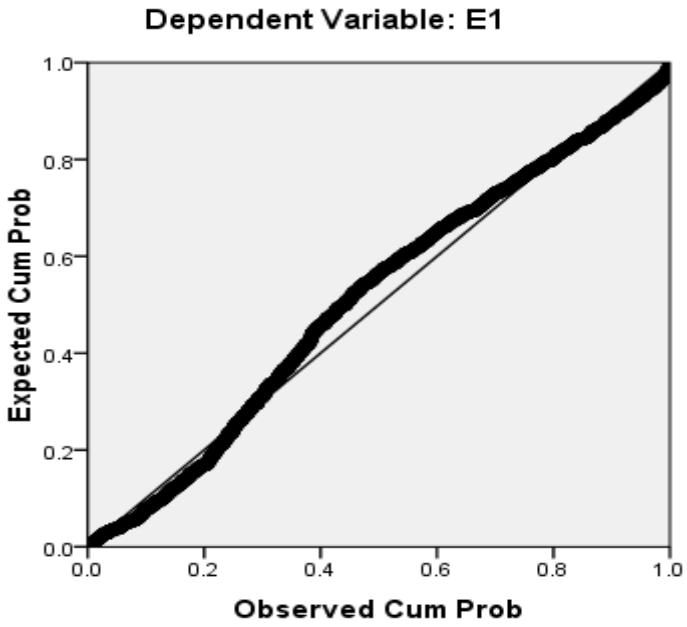


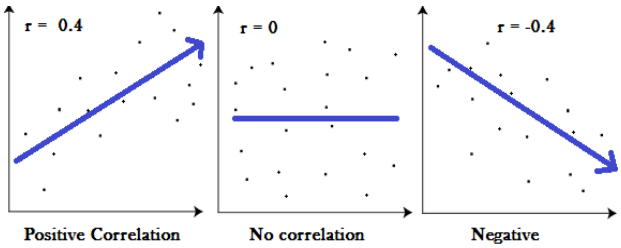
Figure 64: Normal P-P Plat of Regression Standardized Residual - Dependent variable: Environment

To test the validity of all these steps we must conduct a last full SPSS correlation analysis. Correlation between sets of data is a measure of how well they are related. The most common measure of correlation in stats is the Pearson Correlation. The full name is the Pearson Product Moment Correlation or PPMC. It shows the linear relationship between two sets of data. In simple terms, it answers the question; "c*an we draw a line graph to represent the data?* Two letters are used to represent the Pearson correlation: Greek letter rho (ρ) for a population and the letter "r" for a sample.

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[\, n\Sigma x^2 - (\Sigma x)^2 \,]\,[\, n\Sigma y^2 - (\Sigma y)^2 \,]}}$$

The Pearson correlation coefficient can be calculated by hand or one a graphing calculator

The results will be between -1 and 1. Although results will very rarely will be 0, -1 or 1, Most of the researches get a number somewhere in between those values. The closer the value of r gets to zero, the greater the variation the data points are around the line of best fit.



High correlation: .5 to 1.0 or -0.5 to 1.0
Medium correlation: .3 to .5 or -0.3 to .5
Low correlation: .1 to .3 or -0.1 to -0.3

The PPMC is not able to tell the difference between dependent and independent variables. Therefore, as a researcher we have to be aware of the data we are plugging in. In addition, the PPMC will not give us any information about the slope of the line; it only tells you whether there is a relationship. So we did this test in SPSS16.0 to analyze this studies data and find any possible correlation between variations.

		L	E	I	K	P	R	T
L	Pearson Correlation	1	.197**	.172**	.117**	.166**	.140**	.143**
	Sig. (2-tailed)	3168	.000	.000	.000	.000	.000	.000
	N		3168	3168	2112	2816	3168	3168
E	Pearson Correlation	.197**	1	.192**	.194**	.226**	.194**	.163**
	Sig. (2-tailed)	.000	3168	.000	.000	.000	.000	.000
	N	3168		3168	2112	2816	3168	3168
I	Pearson Correlation	.172**	.192**	1	.298**	.237**	.157**	.182**
	Sig. (2-tailed)	.000	.000	3168	.000	.000	.000	.000
	N	3168	3168		2112	2816	3168	3168
K	Pearson Correlation	.117**	.194**	.298**	1	.272**	.122**	.190**
	Sig. (2-tailed)	.000	.000	.000	2112	.000	.000	.000
	N	2112	2112	2112		2112	2112	2112
P	Pearson Correlation	.166**	.226**	.237**	.272**	1	.183**	.201**
	Sig. (2-tailed)	.000	.000	.000	.000	2816	.000	.000
	N	2816	2816	2816	2112		2816	2816
R	Pearson Correlation	.140**	.194**	.157**	.122**	.183**	1	.153**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	3168	.000
	N	3168	3168	3168	2112	2816		3168
T	Pearson Correlation	.143**	.163**	.182**	.190**	.201**	.153**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	3168
	N	3168	3168	3168	2112	2816	3168	

**. Correlation is significant at the 0.01 level (2-tailed).

65: Square correlation matrix of the VOE model

Table above contains the square correlation matrix. According to the table the correlation results in each variable are divided into three major rows: the first contains the Pearson r values; the second contains the probabilities of obtaining those values if the null hypothesis was true, and the third provides sample size. The dependent variable esteem is placed by IBM SPSS on the first row and column, and the other variables appear in the order we entered them into the analysis. Thus, the correlations of self-esteem with the predictor variables in the analysis are lower than we would ordinarily prefer.

In this table for each two variable we can see a value for Pearson's r, a Sig. (2-tailed) value and a number (N) value. As most of the boxes contain a Pearson's r close to 0, this means that there is a weak relationship between these two variables. This means that changes in one variable are lowly correlated with changes in the second variable. If our Pearson's r were 0.01, we could conclude that our variables were not strongly correlated but according to the table they are all between 0.14 and 0.29.

Also all the Pearson's "r" is positive (+) and this means that as one variable increases in value, the second variable also increase in value. Similarly, as one variable decreases in value, the second variable also decreases in value. This is called a positive correlation. Also all the boxes contained Sig (2-Tailed) value which are equal to 0.000. These values tell that there is a statistically significant correlation between each pair of two variables.

Correlation existence	L	E	I	K	P	R	T
L		More than Low	More than Low	low	low	low	low
E	More than Low		More than Low	More than Low	More than Low	low	low
I	low	More than Low		**Strongest** in the table	More than Low	low	low
K	low	low	**Strongest** in the table		More than Low	low	low
P	low	More than Low	More than Low	More than Low		low	More than Low
R	low	More than Low	low	low	More than Low		low
T	low	low	low	More than Low	More than Low	low	

Table 98 : The strenght o f correlation matrix of the VOE model

In diagram below we summarized the importance of relations in the model in a schematic view. As it demonstrates in the diagram, the strongest relation has been noted by both SPSS and IBM AMOS, is between knowledge and ICT factors. Here in this diagram we have divided relation to 3 groups.

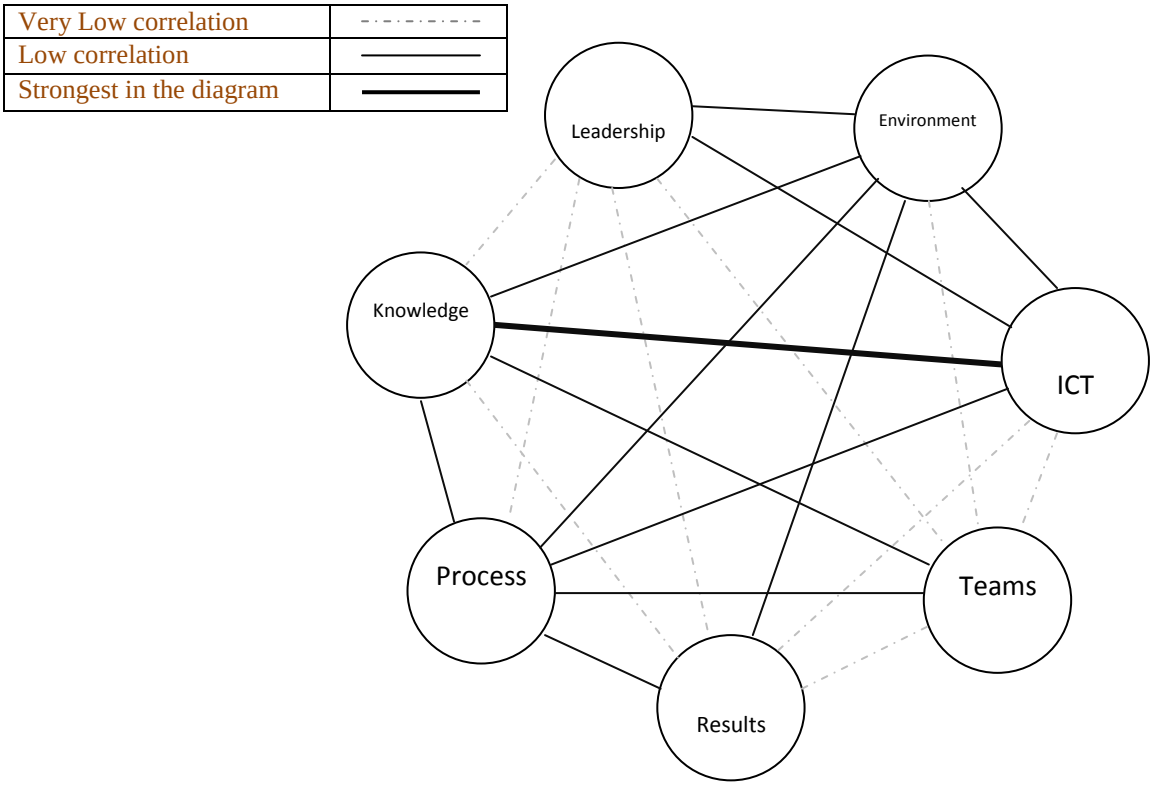


Figure 66: Diagram of strength of relations in the model

3.8. Model main factor scoring

The scoring system of the EFQM excellence model is one of the main characteristic of this model. In developing any excellence model for virtual organization this is necessary to calculate the score of main factors to be a foundation for creating the RADAR scoring matrix for assessing this kind of firms. This matrix also could be part of the self-assessment process as it is possible for organizations to derive a score for themselves . the main application of these scores is in the formal assessing which giving any numerical score should be given by careful consideration.

The scoring that each organization gets should not be seen as a pass or fail indicator but as an indicator of how much improvement has been made and where on its journey to Excellence the organization is currently standing (EFQM 1999). If an organization wishes to be comparing its performance and progress with other organizations, it is helpful to be able to benchmark the score from a self-assessment against other scores. Scoring can also be used to highlight where significant improvements can be made and therefore where priorities could be focused.

Eskildsen et al. (2001) used factor regression coefficients to come up with the specific weight for each main factors. Cheng and Li (2001) used the analytic hierarchy process (AHP) to determine the weights of performance measures of a business process. It is difficult to assess which method is more accurate. Nevertheless, any of the empirical approaches

mentioned would be preferred to "an arbitrary weight structure, which has never been empirically tested" (Eskildsen et al., 2001, p. 783), as with the case of EFQM.

Furthermore, here a method that has been previously applied to excellence models would be preferred. We decided to conduct the factor regression coefficients method because it assesses the actual impact of each criterion on the organization's performance. The regression coefficients are computed for each criterion. The computations were carried out on SPSS, and the results are illustrated in Table below. (Bassioni HA, Hassan TM, Price ADF, 2008)

Based on the Path analysis we conducted in the last section we got the Score coefficients (R Square) for each factor. In the next step, weights for each criterion were calculated on an Excel spreadsheet such that the total weight of all criteria is 1,000. This was achieved by dividing the coefficient of each criterion by the total of all coefficients and multiplying the result by 1,000.

	Variable	Score coefficients (R Square)	Factor weight in the model	Final weight	Weight percentage
1	Environment	0.113	135.9807461	136	14
2	ICT	0.161	193.7424789	194	19
3	Leadership	0.079	95.06618532	95	10
4	Process	0.151	181.7087846	182	18
5	Result	0.08	96.26955475	96	10
6	Team	0.096	115.5234657	115	12
7	Knowledge	0.151	181.7087846	182	18
Total		0.831	1000	1000	100

Table 99:Component score coefficients and factors weights

These weights are going to help us build a assessing tool for virtual organization. This tool will have 2 benefits, first to make self-assessment possible for virtual organization members and second to help assessors have a completely compatible tool with the EFQM original format to assess this new generation of organizations

3.9. Chapter 3 summary

In this chapter, survey collected data were statistically analyzed in three separate parts: Descriptive Analysis which was about the statistical frequency of characteristic of the research sample. Deductive Analysis which included the reliability and validity of model, factor analysis and hypothesis tests. The final set of analysis was to clarify the different aspects of the model (VOEM frame work) like correlations between factor, path analysis and criteria weight calculation. We conducted reliability test, T-test, Friedman ANOVA, path

analysis, analysis of covariance and confirmatory factor analysis to answer the study questions.

The questionnaire survey got distributed online through a standard web platform of "kwiksurveys.com" to the entire potential respondent (this data have been collected before). At the end of data collection process total acceptable and complete responses were 352. Among 352 respondents, 132 (37%) were female and 220 (63%) were male. Among 352 respondents age wise, 8 were up to 25 (2%), 42 were 25 to 35 years old (11%), 83 were 35 to 45 (23%), 125 were 45 to 55 (35%) and 94 were over 55 (26%).

We conducted "principal component analysis" for all the 7 main factors of the questionnaire. As a result for all these factors the extraction of a single factor has been observed, which reflects the construct validity of the measuring instrument. In the next step we conducted the same "principal component analysis" test on all the data that we collected for the entire seven factors. In this case (Also) the PFA test results indicated that a single variable extracted. This means that the model was valid because all 7 factors could be lead to one goal which is Excellence.

All the hypotheses that have been analyzed by T-test have been proven with a good level of significance. Also we found some hypothetical relation between different demographical characteristic of the sample and main Excellence factors. To test that we conducted One-way ANOVA test (in SPSS) and found there meaningful relation. For example importance for Leadership for different gender, Importance of ICT framework for different gender and difference of Leadership perception for various position in company.

In the process of measuring the correlations between factors in the model, first we needed to test the fitness of the model. We used IBM AMOS software to see if this model is fit for and if we need to eliminate any relation or add any other correlation. In this chapter we found that although the fitness of model was not in the high level but it was in a good position to say that the model is 'FIT".

To finalize the weights for each main factor (main base for developing assessment tool) we used the Score coefficients (R Square) for each factor and calculated weights for each criterion on an Excel spreadsheet. This was achieved by dividing the coefficient of each criterion by the total of all coefficients and multiplying the result by 1,000. These weights are useful to help us build a assessing tool for virtual organization.

In the next chapter we will discuss more about the results that we found here.

4. Chapter four: Discussion of result

4.1. Introduction

> *"Out of damp and gloomy days, out of solitude, out of loveless words directed at us, conclusions grow up in us like fungus: one morning they are there, we know not how, and they gaze upon us, morose and gray. Woe to the thinker who is not the gardener but only the soil of the plants that grow in him."*
> *(Friedrich Nietzsche, Daybreak, 1881, p.382)*

After reporting the results of this PhD thesis in last chapter, we will summarize the key findings of our research as well as reflect on our main contributions and recommendations. We first return to the beginning of this book, where we established the goals of the research and designed the research questions that needed to be answered.

As we discussed in chapter 1, the rapidly improving reach, accessibility and capability of information and communication technologies (ICTs) has created the possibility of a virtual world in which face-to face interactions are replaced by interactions via technology-mediated-communication. At the same time, organizations have also been increasingly employing team-based organizational structures to improve performance, believing in the value of teamwork to deliver productivity, flexibility and collaboration. The nexus of these two trends is the emergence of the concept of 'Virtual Organizations'.

In the same chapter we also discussed about the Excellence models and specifically EFQM as the last expression of the dominant approach of excellence that is TQM. EFQM is a discipline that positively contributes to the overall performance of an organization. Also the usage level of excellence models in the especially in public and private sectors increased.

We can observe that EFQM also gained increasing popularity by small and medium sized enterprises. Considering the great amount of threats that organizations now face in this world, as well as the necessity to respond to more demanding regulations and liability, the public sector has started to use excellence model as a roadmap to total quality management.

According to Literature review there are different models which try to capture the complete essence of a VO and be a good representation for what is inside this kind of agile structure but VO models does not cover all the theoretical aspect of Virtual organizations. In order to address this challenge we tried to suggest a Global Virtual organization model to summarize what we have discussed in the chapter 1. Then in the Extensive Literature Review section we tried to identify all the possible angels of productivity in a virtual organization.

In the second chapter we tend to establish an appropriate theoretical foundation for our research methodology so we reviewed the main branches and schools of epistemology briefly. The main objective of this study is to develop an excellence for Virtual organizations. Although the epistemological view have been chosen, researcher is not committed to any believe, as Popper and Kuhn both believe that commitment to one belief is unacceptable. Now only interpretive and functionalist paradigms are left. On the one hand, the research

questions and objectives implicitly assume that organizational world is nothing but what is created by individuals. Individuals (VO managers, team managers and team members) are the ones who create the VO, and work within it. On the other hand, we are trying to answer some question and examine hypotheses with a problem-solving approach. Using a survey would be justifiable with this view, which is more compatible with the positivist epistemology similar to what is applied in natural sciences.

In the chapter 3 we were analyzing survey results, we found interesting findings and it was the empirical support for the construct validity of our model that we are going to introduce in this chapter. Although we still consider this Virtual Organization excellence model a developing method that needs additional enhancements, we strongly believe that it could be a pertinent instrument for the assessment of Virtual organization. This also can work as a road map for who ever want to create a productive VO.

After reporting the results of this PhD thesis in chapter 3, here we will present VOEM model that we developed based on the complete research process. In the next section, to create more clear vision about VOEM we will compare each main factor of VOEM and EFQM. We will see how each sub-criteria in EFQM have been presented by one or more sub-factors in VOEM. This analysis would cover all the details regarding the main factors and sub-criteria in VOEM and also the reason of not existing some EFQM factors in VOEM and the newness of some factors in VOEM.

After answering to secondary questions in previous chapter, this is the place where we can answer to the primary question of the study: To what extent Virtual organization Excellence model is similar to the current and available EFQM excellence model?

We consider that this study has a number of practical as well as scientific Contributions. These implications are derived from the literature review as well as from the findings of this study. Here we want to first mention that by establishing the goal of creating an Excellence model for VOs, we have tried to adapt and improve all VO models into an Excellence model framework and this has led us to investigate some theoretical propositions that could respond to the difficulties found in the literature.

4.2. The VO excellence conceptual Model

One of the key problems with virtual organizations is we don't know how to describe the components used in virtual organizations because they appear to be dynamic, dispersed, transient, type-vague (or we don't know their types), heterogeneous, semantically informal, and disorderly. The existing models lack effective modeling of virtual organization components.

Our observations were suggesting focusing on the following aspects:

- ✓ First, we should model both static resources and dynamic states of a virtual organization.
- ✓ Second, we should build up the virtual organizations with abundant static resource.

- ✓ Third, we should combine the semantic modeling with the users' requirements description for virtual organizations due to its importance.

Based on what we discussed in the VO global model in chapter 1, we tried to capture the most important aspects of a VO in a model inspiring by nature. After presenting results in the chapter 3 and in a form of a synthetic model including relations inside model, here we need to develop an excellence model compatible with the EFQM. We call this VOEM (virtual organization Excellence model). Figure below show the level one of this proposed model (inspired by EFQM) which we will explore in the next sections one by one.

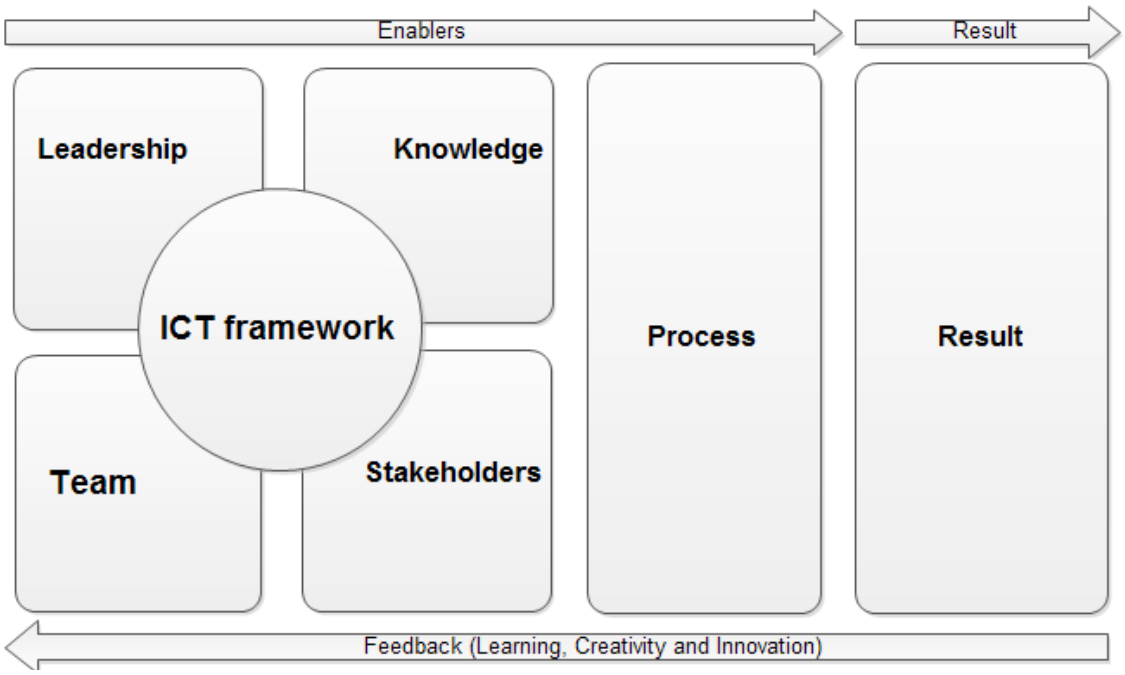


Figure 67 : VO excellence conceptual Model

The Virtual Organization excellence model (VOEM) measures the virtual organizations in terms of Total Quality Management applications. This model also can be used as a self assessment framework for evaluating the strengths and weaknesses of the virtual organizations. As we mentioned in the chapter 1 self-assessment quality of a model is so useful because each company could compare activities and results of their firm with the excellence model.

VOEM enables Virtual enterprises to find strengths and improvement areas in order to develop their improvement plans which should be included in organizational strategic plan. EFQM 2013 was the main inspiration of VOEM and this considered as a strength for our model as EFQM has being implemented by many European organizations to improvement of their management systems since 1992 for the European Quality Award.

The VOEM (just like EFQM) comprises of "Eight Basic Rules of Excellence" principles of the Total Quality Management that guarantee the success in the strategic management process. These are:

1. Results orientation (achieving results, trough Result factor),

2. customer focus (creating sustainable customer value, trough Environment factor),
3. leadership and constancy of purpose (visionary and inspirational leadership, trough leadership factor),
4. management by processes and facts (managing through a set of interdependent and interrelated systems, processes and facts, trough Process factor),
5. people development and involvement (maximizing the contribution of employees , trough Teams factor),
6. Continuous learning, innovation and improvement (changing the status quo, trough innovation and feedback arrow),
7. Partnership development (value adding partnerships, trough Environment factor)
8. Corporate social responsibility (meeting expectations of stakeholders, trough Results factor).

The Virtual Organization excellence model (VOEM) has seven criteria for the assessment. Six of them are "Enablers", involving what the organization does, and the remaining one is "Results", including what the organization succeeds.

While the arrows on the top shows the flow of the model from Enablers to Result , the arrow in the bottom indicates the Feedback , learning , Innovation and creativity that helps to improve enablers to improved results. The basic assumption of this VOEM model in l is that excellent results of a Virtual organization are achieved through directing the teams, ICT framework, Knowledge, Environment (customers, stakeholders, partners and suppliers) and processes in proper Virtual leadership manner.

The most important advantage that the Virtual organizations can get by applying this model is recognizing the organization wholly and revealing its employee's strengths and weaknesses, which provides data for development plans.

Besides all this characteristics, there are many more aspects we need to clarify in order to have a mature Virtual Organization Excellence model. For example Fundamental values, RADAR logic, sub criteria, etc. in the next section we are going to clarify one by one to create a solid understanding of our conceptual model.

4.2.1. Values and fundamental concepts

The Fundamental Concepts of Excellence in EFQM 2013 outline the essential foundation for achieving sustainable excellence for any organization. They can be used as the basis to describe the attributes of an excellent organizational culture. They also serve as a common language for senior management. These concepts are:

1. Sustaining Outstanding Results
2. Succeeding through the Talent of People
3. Managing with Agility
4. Leading with Vision, Inspiration & Integrity
5. Adding Value for Customers

6. Creating a Sustainable Future
7. Developing Organizational Capability
8. Harnessing Creativity & Innovation

Based on these concepts we tried to develop fundamental concept for our new Virtual Organization excellence model. According to the analysis in the chapter 2 (part 2), regarding the questionnaire we created a connection between these fundamental concepts and statements in the questionnaire. Expecting results over the average means that these values have been emphasized and admitted by our expert trough the survey.

According to the Extensive Literature review, we have found that these fundamental values are implicit. Researchers did not discuss it directly but there were studies that discuss the history, the principles, and the applications. The values were not stated directly but more were implicit and not explicit. The core values are somehow hidden within the fundamental concepts.

Beside the Literature review we also found good content in the interviews and expert meeting. EFQM assessors believed that these fundamental values are somehow inside of the model itself:

"Besides these 8 fundamental values, the model doesn't tell you what your values are or should be. It can't. While it is possible to list values that some excellent organizations have, it is up to every organization to determine what its own values are. Even the EFQM organization has its own values: Passionate about excellence, Building trusts, Working in partnership, Engaging people; but these are for itself and do not appear in the model. Within the EFQM model, there is a lot of valuable guidance but it does not list any values. Some of the Fundamental Concepts are things which might be values for some organizations but they shouldn't be taken as a list of values."

"The Fundamental Concepts of EFQM and the Core Values of Baldrige model are evidence-based characteristics of high performing organizations. As a consultant I will tell organizations that if you want to be the kind of organization represented by the EFQM Fundamental Concepts then the EFQM Enablers and results are a kind of road map to help you get there. I find in most cases that a high-performing organization's own values align closely with the Fundamental Concepts or the Core Values - even if they aren't yet using either model."

Based on what mentioned, the Fundamental values are a kind of help and pointing the way for other organizations. These are essential element for any origination to interpret and apply the concepts (philosophies and values) in a way that is appropriate and meaningful to the specific organization. So although the concepts give an explicit lead, they are not prescriptive in how these are applied to individual excellence programs, so that is maybe why they appear more implicit.

If we take a deeper look at the fundamental concepts we will find that they mainly represent the value of the customer, employee, finance and the internal processes which are the core values of any excellence model. Also VOEM and EFQM are non-prescriptive. They do

indicate what the values should be but these must be determined by the Virtual Organization itself based on what is important to them.

4.2.2. RADAR Logic Radar factors and each characteristics

No Excellence model could be complete without the logic to measure it, so in this study's suggested Virtual organization excellence model just like EFQM we are introducing RADAR logic to add a measurable characteristic to the model. As we also discussed in the chapter 1, RADAR consists of four elements: Results, Approach, Deployment, Assessment and Review.

This logic states that a Virtual organization needs to determine the Results it is aiming for as part of its policy and strategy making process. These results cover the performance of the virtual organization, both financially and operationally, and the perceptions of its stakeholders. Plan and develop an integrated set of sound Approaches to deliver the required results both now and in the future.

Deploy the approaches in a systematic way to ensure full implementation while the only way is to developing virtual process based in VO's ICT framework. Assess and Review the approaches followed based on monitoring and analysis of the results in the ICT framework achieved and ongoing learning activities. Finally, identify, priorities, plan and implement improvements where needed.

When using the VOEM Model within a Virtual organization the Approach, Deployment, Assessment and Review elements of the RADAR logic should be based in ICT and addressed for each Enabler criterion part and the Results element criterion part.

There is not only one use for the RADAR logic; it can be used under a number of different circumstances. The most commonly known is assessment or Self-Assessment using the RADAR scoring matrix. In a Virtual organization when a Leader wants to develop a management system the RADAR elements can come handy together with the Model criterion parts which helps the leader to stimulate what he or she has in mind. It will prompt anybody inside Virtual organization to consider questions regarding the approaches to be used, how solution will be deployed and how to measure the effectiveness of chosen path. RADAR also can be used as a method of structured problem analysis and identify problem areas.

At the end of this chapter, right after finalizing the scores if each criteria we present the RADAR Matrix showing the construction of elements and attributes in a table format used to apply the logic when scoring an organization follows.

While RADAR logic have been fully described by EFQM foundation , we discussed about it in the Literature review , but there was not enough evidence that this tool would affect the productivity so in the Extensive literature review we could find enough evidence of using this tool in Virtual organization . In the field experiment with the T-stab Virtual organization we never get to the point to conduct a self assessment using RADAR but in the expert meeting and interviews there was discussion about this tool as we are going to illustrate here.

One of the main subjects that expert raised in the meeting was the difficulty of measuring criteria like leadership with RADAR logic. As one of the EFQM assessors believed that a Virtual Organization should be able to determine what is important to the VO according to mission and vision and then assess whether they leader is doing this in a consistent manner that drives improved results.

In other words the key is in assessing whether leadership has processes in place to address the nine criterions addressed in the Leadership category. EFQM asks leaders to ... Set, Shape, Share and Make it happen. Set an agenda, Share the vision and inculcate values, shape the future & make it happen, act as role models, inspire trust, and demonstrate flexibility & agility.

"RADAR for example in leadership could be:

- What do we want to achieve in general or specific perspective - R
- What is the leadership approach e.g. organizational culture, appropriate leadership style etc... that could deliver it - A
- How do we deploy the defined leadership approach e.g. organizational culture, appropriate leadership style etc. to the organization horizontally and vertically - D
- How do we evaluate the effectiveness of the leadership approach e.g. organizational culture, appropriate leadership style etc. And what do we do to improve/ change / fine tune it.

Then the whole starts again and again and again....! The key is to define the "leadership" that is relevant to each specific Virtual organization!"

As a quick review the interviews and Expert meeting the whole discussion about RADAR was around the main logic of it. The fact that RADAR is simply a tool within an assessment process through which criteria of the model implemented better and this logic are used to understand how well the concepts are embedded within an organization. To complete the level two view of the model we need to analyze the results of the research and apply to this level.

4.3. Survey Results

4.3.1. Findings regarding the characteristic of research sample

The questionnaire survey, which included 59 statements targeting Virtual organization excellence, was distributed through a standard web platform (www.kwiksurveys.com) to all the existing emails in the database that were collected. Finally total reliable number of responses was 352 and Among 352 respondents, 132 (37%) were female and 220 (63%) were male. Among 352 respondents age wise, 8 were up to 25 (2%), 42 were 25 to 35 years old (11%), 83 were 35 to 45 (23%), 125 were 45 to 55 (35%) and 94 were over 55 (26%).

On the other hand among 352 respondents in terms of Company scale, 58 were working in Local (16%), 161 were in national (45%) and 133 were working in an International Company

(37%). Also among 352 respondents in terms of Company type, 138 were working in Traditional organization (39%), 122 were in Virtual organization (34%) and 92 were working in Hybrid organization (26%). Last demographic characteristic of this study was the position of the respondents and among 352 respondents in terms of Position, 159 were Leaders (42%), 125 were Managers (35%), 31 were Project managers (8.8%) and 37 were Team managers (10%).

Table below is the summery of 6 other studies on Virtual organization comparing the characteristic of research sample. Although as we discussed in the chapter 3, the 352 responses passed the normality test in order to have a better image of the same characteristic of other studies we conducted a quick research and gathered a summary of these information in table below.

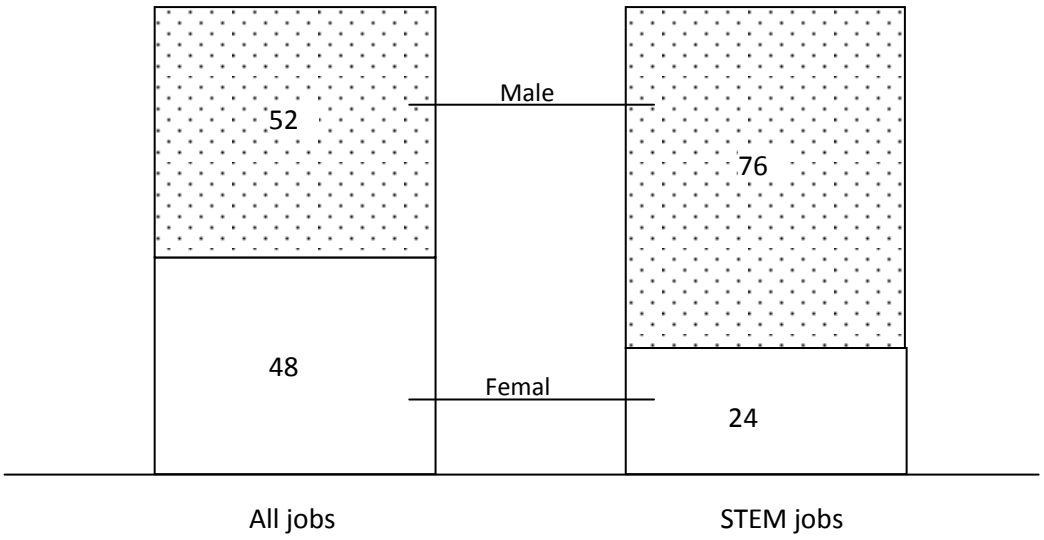
author	Sample size	Characteristic percentage				
		Male/female	position	age	education	Years of Experience
Lee-Kelley (2006)	108	95 males 13 females	78% project managers	-	-	-
Kabasakal H Asugman G Develioğlu K (2006)	525	47 male 53 female	Manager 22 Assistant manager 16 Supervisor 17 White color employee 22 Other 23	18-30 56 31-40 28 41-50 12 >50 4	Elementary 2 High school 26 2 year collage 7 University 57 Graduate 8	-
Lambe CJ Webb KL Ishida C (2009)	124	51.2% male 48.8% female	-	average age = 33.9	all but one= at least Bachelor's degree 32.9% = Master's degree	-
Yaghoubi NM Bandeii M Moloudi J (2011)	102	87.38% male 12.62% female	-	Majority of the respondent between 30 to 40 years (63.1%).	Majority of the respondent have masters and bachelors degree	31% = >15 32.1% = 10 to 15 29.7% = 5 to 10 7.2%= <5 years
Shirshams A Ashoub M (2012)	60	40% Male 60% Female	-	-	-	65% over 15 years
Lin C Standing C Liu YC (2008)	198	47.69 male 52.31 female	-	average age= 24.50, range of 20 to 31	-	-

Table 100: Summary of 6 Research sample characteristic

As it is clear in the table above all these studies have been chosen from the gap of less than 10 years. Regarding the sample size our study (352) is way higher than average (186) of these studies. Despite of the fact that there were no intention to choose men over women in the database and it was totally accidental and random but we found that there are more men in the sample than women. This pattern was quite the same in the other 6 studies except one of them that the number of females in the sample was a little bit higher than others. So this characteristic was also quite normal despite the fact that in the technology world there are more men than women working.

As we discussed before in chapter 1 Virtual Organization exists because of the advancement of technology so this is normal that people who work in such organizations must be in the technology or STEM fields. STEM is an acronym referring to the academic disciplines of science, technology, engineering, and mathematics. Figure below shows the U.S. Department of Commerce, Economics and Statistics Administration report that published in August 2011 which clearly demonstrated the Gender Gap to Innovation STEM field. And it is quite explained the distribution of gender in our study sample.

One of the most important characteristics of our sample was the distribution of respondents in different position, but as we could not find enough other researches in the same field who reported these characteristic we could not conduct any comparison.



Note: Estimates for employed persons age 16 and over

Figure 68 : Gender gap in all and STEM jobs (based on ESA calculation from American Community survey public-use micro data).

4.3.2. Reliability and Validity of measuring instrument

As we discussed in chapter 3 the reliability test for our questionnaire had the result of Cronbach's alpha = 0.934, so this questionnaire is reliable at the level for each of the 59 questions. As we mentioned in the chapter 2 (part 2) for the validity test we first conducted evaluation by expert and then factor analysis.

As mentioned in chapter 3 in factor analysis we found that questions designed in each part, truly measure one factor. The last step is to perform a confirmatory factor analysis which is used to reassure the single factor structure as expressed by the CFA Model in Figure below, where the criteria of the Construction Excellence Model are related to a latent variable that is assumed to be "excellence".

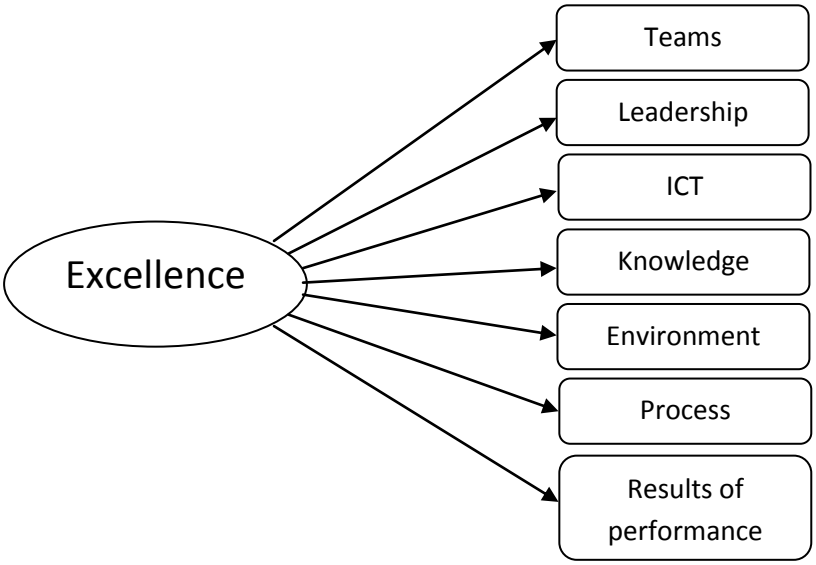
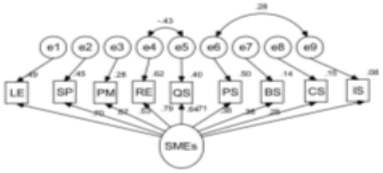
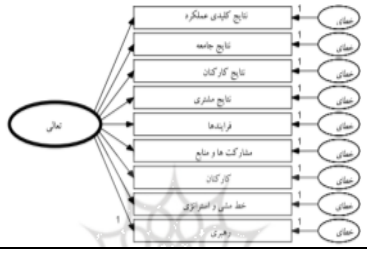


Figure 69 : Conceptual model of the study

Therefore, the empirical data confirms the CFA model in Figure above, which illustrates the expression of the latent variable "excellence" in terms of the model criteria and this gave us this permission to start analyzing the results.

While there was not any opportunity to focus on this dimension of the study from the literature point of view, here we tried to summarize the most related researches from the confirmatory factor analysis point of view. This table will hale us see other researcher's challenge to conduct analysis on the uni-factor and the software that they used.

Author	Software	Title	Model
Wu CC Wang SH (2007)	AMOS	one-factor EFQM measurements Table	
Calvo-Mora Schmidt A Picón Berjoyo A Ruiz Moreno C Cauzo Bottala L (2013)	SPSS	TQM Uni-factorial tests	
Khaleghi AH Hajikarimi AA (2012)	SPSS Amos	Customization of criterion framework of EFQM business Excellence model	

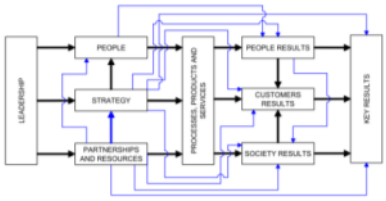
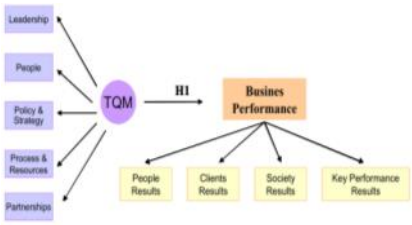
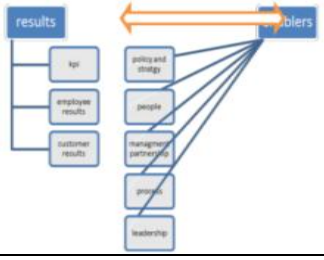
Bassioni HA Price ADF Hassan TM (2004)	LISREL	model of excellence criteria	
Põlm A (2007)	LISREL, PLS	Quality Awareness	
Gómez Costa Rafael Lorente (2012)	LM test	internal relationships of the EFQM Model	
Santos-Vijande et al (2007)	SPSS 12.0 and ESQ. 6.0	TQM-EFQM model	
Alsarayreh B Khudair H (2012)	Amos	Structural Equation Modeling Analysis between Enabler and Results in EFQM	

Table 101: model confirmatory factor analysis in some excellence quality management studies

According to table above, we could see other researchers conducted confirmatory factor analysis on their data trying to see if the entire data fitting one factor model such as excellence and productivity. In 1998 Gerbing and Anderson suggested using confirmatory factor analysis (CFA) for scale development because it affords stricter interpretation of uni-dimensionality than what is provided by traditional approaches such as coefficient alpha, item-total correlations, and exploratory factor analysis (Anderson and Gerbing, 1988). According to Anderson and Gerbing (1988), after data collection, the measure's purification procedures should be used to assess their reliability, uni-dimensionality, discriminant validity, and convergent validity.

Based on this background and confirmatory factor analysis results gave us enough confidence that our model fits the theory of excellence. We collected enough evidence that the measures were uni-dimensional, whereby a set of indicators (factors) shares only a single underlying construct. Now the next step would be to analyze the results that hypothesis test indicated.

4.3.3. Secondary Study Questions

As it got discussed in chapter 3, we used T-test and ANOVA Fridman test to answer to the questions of this study. Table below show the 7 hypothesis of this study and a summary of the T-test conducted to test them. If T-test result was not meaningful, then there is no significant evidence that we could approve the hypothesis but according to the information inside the table all 7 hypothesis with good significant level.

No	Hypothesis	Mean	Significant	Approved?
1	Leadership has positive effect in VO Excellence.	7.88	.000	YES
2	Team has positive effect in VO Excellence.	8.04	.000	YES
3	Knowledge has positive effect in VO Excellence.	7.27	.000	YES
4	ICT framework has positive effect in VO Excellence.	7.56	.000	YES
5	Process has positive effect in VO Excellence.	7.42	.000	YES
6	Result has positive effect in VO Excellence.	7.66	.007	YES
7	Environment has positive effect in VO Excellence.	7.00	.002	YES

Table 102 :7 hypothesis of this study and a summary of the T-test conducted to test the

Table above is the second confirmation for this studies model. First we got the confirmation by Confirmatory Factor Analysis (CFA) as the pig picture and here the test of Hypothesis gives us a clear image of VO and EFQM experts' opinion. They clearly approved that Leadership, Teams, Knowledge, ICT, Process, Environment (stakeholders & partners) and finally paying attention to the Organizational Results are positively effective in VO productivity and Excellence.

In the next sub-section we will analyze each Hypothesis and the Literature back ground and the way that this part of survey can shape a certain percentage of study's Model.

4.3.3.1. Hypothesis 1: Positive effect of leadership on VO excellence

As predicted, the analysis of results indicates support for the positive effect of Leadership in the Virtual organization productivity and excellence. As we discussed before according to statistical results, significance rate was less than 0.05. This means that Leadership is an

effective Factor in Virtual organization productivity and could be part of its Excellence model.

The second conclusion of this hypothesis and the questionnaire that we developed to asses this is to clarify what we mean by "Leadership is important in VO's productivity" and what is Leadership. According to the Research methodology and based of "Extensive Literature review" we extracted the most important statement targeted what a Leader should do in a Virtual Organization. Based on the frequency of this statements and Field experiment ,Interviews and Expert meeting we summarized all those statement to first , cover all the point and second, remain in the less than 10 (to keep all the questionnaire leveled).

At the next step we assigned 9 questions to Leadership factor which basically was the most important and frequent Leadership roles in a Virtual Organization. Based on Result analysis of the 352 experts we tried to rank these statements. Table below shows that results of Friedman test on 9 Leadership questions and ranking the results to see which one was indicated the most important by experts.

	Statements	Mean Rank
L1	Leader creates clear strategy, policy, mission, values, goals, objectives, culture, behaviors, performance metrics, VO governance principles, quality improvement rules, based on the present and future expectations of all stakeholders. Leader also should review and update them periodically	5.91
L8	VO Leader is more a coach and moderators of functions, they are sensitive to member's schedule, gets to know them, have one-to-one contact with all members to build relationships, inspire them to have a positive competition, using effective and suitable motivation methods to build trust.	5.87
L9	Leaders relate to members at their own levels, appreciates their opinions and suggestions, care about their problems, expresses a personal interest in them, maintain a consistent trust, providing feedback.	5.33
L7	Leaders clearly defined job descriptions, performance appraisal, career development, compensation, flexible work arrangements, recruitment, training, professional skills development, benefits and compensation, ensuring legal compliance according to VO's policy and strategy.	5.21
L6	Leaders clarify communication protocols (what, to whom, when, and how), supervise and give feedback.	5.16
L4	Leaders handling all interactions with suppliers, partners, competitors and society including finding, negotiating and e-contracting (information, pre-contractual, contracting, and enactment phases).	4.77
L2	Leaders participating, supervising, supporting and giving feedback about continuous excellence improvement processes based on content of ICT framework.	4.66
L5	Leader clearly determining VO's structure, business/collaboration process modeling, access levels (assets/resources, intellectual property, etc.) for each position using best potentials in ICT framework.	4.45
L3	Leader chose the most appropriate and suitable ICT framework for VO.	3.63

Table 103: Leadership importance means per question

According to the fact that these questions were designed in Excellence models self assessment format, it is a bit long to see each main point clearly , so here we summarized the essence of each these 9 statements to convey a more sharp image:

- L1 (5.91): Setting VO strategy design, Rules, Vision, Mission, Performance metrics, etc.
- L8 (5.87): Relationship and Trust building, conducting one to one communication

- L9 (5.33): Having leadership soft skill and Personal skills
- L7 (5.21): Clarifying Job description, Recruiting, compensation rules and norms
- L6 (5.16): Clarifying Communication protocols
- L4 (4.77): Supply chain management ,being responsible for E-contracting, negotiation, etc.
- L2 (4.66): Being a supervisor and sending feedback
- L5 (4.45): Setting VO structure, process and Access levels for teams
- L3 (3.63): Choosing the most appropriate technology (Task- technology fit) for VO

To have a better understanding we will mention the mutual factors in the EFQM model. In this case we have 2, Leadership and Policy and Strategy. In the Virtual Organization Excellence model (VOEM) we found out that the Leader would be the person who is setting VO's Vision, mission and strategy or at least this person is the main focal point for all the decisions in this regard.

EFQM Leadership Definition:

Excellent Leaders develop and facilitate the achievement of the mission and vision. They develop organizational values and systems required for sustainable success and implement these via their actions and behaviors. During periods of change they retain a constancy of purpose. Where required, such leaders are able to change the direction of the organization and inspire others to follow.

EFQM's definition of a Leadership in an excellent organization is so wide that any additional sentence or change to adopt it to VO world would be unnecessary. This definition would be relevant even for the Virtual organization Leadership but the main difference would be on the sub-criteria and the factors that a VO must put some more attention on compare to a traditional organization.

EFQM Leadership Sub-criteria:

- **1a.** Leaders develop the mission, vision, values and ethics and am role models of a culture of Excellence.
- **1b.** Leaders are personally involved in ensuring the organization's management system is developed, implemented and continuously improved.
- **1c.** Leaders interacts with customers, partners and representatives of society.
- **1d.** Leaders reinforce a culture of excellence with the organization's people.
- **1e.** Leaders identify and champion organizational change.

According to the key concepts in each sub-criteria and a comparison between two list in 2 models we could see that L1~ 1a. Although EFQM considers no ranking in the sub-criteria but in the survey result of the current study it was clearly indicated that developing mission, vision and strategy is the most important duty of all the leaders in both traditional and Virtual organizations.

If we take quick look at the second EFQM Leadership sub-criteria we could see that L5 ~ 1b. Leaders are personally involved in Setting VO structure, process and Access levels for teams but EFQM devolved the development, implementation and improving of organizational management system to the Leader. In this study's suggested Virtual Organization Excellence model (VOEM) this duty have been divided to 3 parts , so the equation is better to be 1b ~ L5 + P4 + P8.

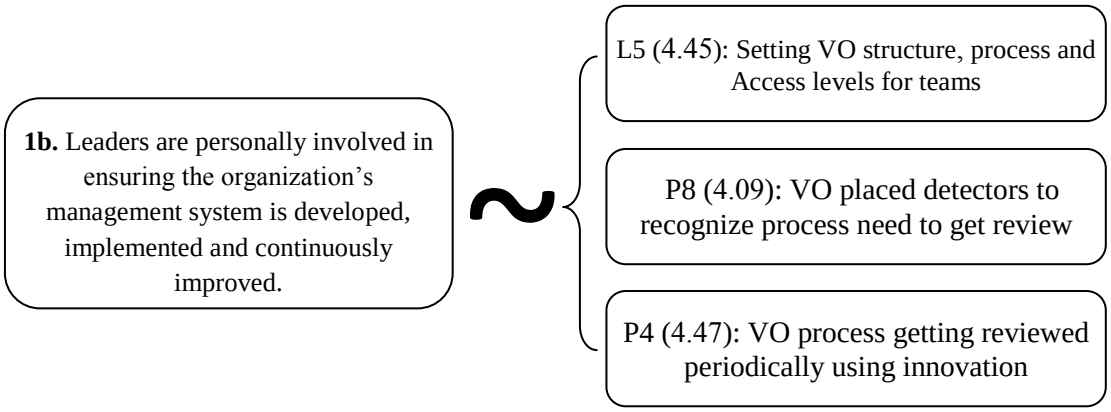


Figure 70: EFQM and VOEM equition for 1b sub-criteria

Just like this method we can move forward to analyze 1c which indicates that Leaders interacts with customers, partners and representatives of society. In this study's suggested Virtual Organization Excellence model (VOEM) this has been presented in the L4 which says: Supply chain management ,being responsible for E-contracting, negotiation, etc are Leader's duty. So the conclusion is 1c ~ L4.

According to EFQM sub-criteria 1d, Leaders reinforce a culture of excellence with the organization's people. Based on Literature review we saw that Leaders are not only responsible to create the excellence, as the Cultural contexts in a Virtual organization(Shea & Guzzo, 1987; Sundstrom at el, 1990) are the cultures surrounding the members at three levels ,professional, organizational, and national culture (Schein, 1992; Hofstede, 1991).

The culture in all levels would affect team norm development, communication, decision making, and performance evaluation (Furst, Blackburn & Rosen, 1999) and this study's suggested Virtual Organization Excellence model (VOEM) presented that V-Leader are responsible to come with a clear definition with each level and try to establish a solid culture in all of them and this also contains Excellence culture in all the levels. Although we could not say that 1d have one equivalent in VOEM but we can put L8 and L6 in the same category.

As we mentioned above for Leadership in VOEM there are 2 mutual factors in the EFQM model: Leadership and Policy and Strategy. As we analyzed Leadership here we will study the Policy and Strategy criteria.

EFQM Policy and Strategy Definition

Excellent Organizations implement their mission and vision by developing a stakeholder focused strategy that takes account of the market and sector in which it operates. Policies, plans, Objectives, and processes are developed and deployed to deliver the strategy.

EFQM Policy and Strategy Sub-criteria

Policy and Strategy cover the following four criterion parts that should be addressed.

- **2a.** Policy and Strategy are based on the present and future needs and expectations of stakeholders.
- **2b.** Policy and Strategy are based on information from performance measurement, research, learning and external related activities.
- **2c.** Policy and Strategy are developed, reviewed and updated.
- **2d.** Policy and Strategy are communicated and deployed through a framework of key processes.

Although this study's suggested Virtual Organization Excellence model (VOEM) does not include any main factor as "Policy" but According to Literature review, Extensive Literature review, interviews, filed experiment and expert's meeting we came up with 3 sentences that addressed the strategy issue in the VO. According to different point of view that we used to develop the questionnaire we put each in the more relevant category depend of the strategy's life cycle including creation or review.

Creation: L1 (5.91): Setting VO strategy design, Rules, Vision, Mission, Performance metrics, etc.

P6 (4.54): Process has been designed to fulfill VO's ultimate strategy

Review and renew: R2 (4.98): VO reviews the fitness of strategy in ultimate VO goal constantly

After analysis of the sub-criteria of Policy and Strategy in EFQM model we could see that VOEM covered all its content. Policy and strategy was considered having less priority and we decided not to devote any main factor in this area in VOEM.

In short, leadership in VOEM containing wider roles and function compare to the same criteria in EFQM. We saw some similarities in the main roles of a leader but for example in the policy and strategy criteria VOEM divided this factors sub-criteria between leadership and process.

4.3.3.2. Hypothesis 2: Positive effect of ICT framework on VO excellence

As predicted, the analysis of results indicates support for the positive effect of ICT framework on the Virtual organization productivity and excellence. As we discussed before according to statistical results, significance rate was less than 0.05. This means that ICT framework is an effective Factor in Virtual organization productivity and could be part of its Excellence model.

The second conclusion of this hypothesis and the questionnaire that we developed to asses this factor is to clarify what we mean by "ICT framework is important in VO's productivity"! And what "ICT framework" stands for. According to the Research methodology and based of "Extensive Literature review" we extracted the most important statement targeted what are the characteristics of an ICT framework in a Virtual Organization. Based on the frequency of this statements and Field experiment ,Interviews and Expert meeting we summarized all

those statement to first, cover all the point and second, remain in the less than 10 (to keep all the questionnaire leveled).

ID	Statements	Mean Rank
I1	Having an ICT framework providing: email, Instant Messaging, groupware/Shared Services ,web conferencing, remote access, file transfer, report generating, teleconferencing ,voice-data conversations at the same time and well graphically designed to be user-friendly like a "Real" physical space	6.27
I5	Availability of dashboard of results (financial, recourses, etc) for leader's decision making based on all input data.	5.75
I3	ICTF having cloud computing ability as SaaS (Software as a service), PaaS (Platform as a service) or IaaS (Infrastructure as a service) to decrease system errors and threats such as hardware damage, supply failure, fire, flood, etc compared to in-house server	5.07
I2	Managing, maintaining and developing the ICTF periodically (have access to 24/7 support)	4.98
I8	Providing members with the flexibility in where and when work is performed and reported trough (text, voice, and video) in ICTF.	4.85
I6	To increase quality of virtual working ICTF need to be Technology-Task-Structure fit.	4.73
I9	ICTF provides VO a high level data, information, and knowledge security in three technical, organizational, and legal dimensions.	4.51
I7	Enabling VO to get to its goal in most efficient way using less recourse in ICTF.	4.43
I4	Providing each VO member a clear identity and access level in ICTF while all actions in the system are recordable and traceable.	4.40

Table 104 : ICT importance means per question

At the next step we assigned 9 questions to ICT framework factor which basically was the most important and frequent ICT framework characteristics in a Virtual Organization. Based on Result analysis of the 352 experts we tried to rank these statements. Table above shows that results of Friedman test on 9 ICT framework questions and ranking the results to see which one was indicated the most important by experts.

According to the fact that these questions were designed in Excellence models self assessment format, it is a bit long to see each main point clearly , so here we summarized the essence of each these 9 statements to convey a more sharp image:

ICT Framework

- I1 (6.27): Possibility for VO members to communicate to each anywhere and anytime
- I5 (5.75): ICT framework includes an administrative dashboard for VO leader
- I3 (5.07): ICTF is Cloud based (public or private) to prevent and hazard
- I2 (4.98): ICTF includes a 24/7 support and maintenance
- I8 (4.85): ICTF makes it possible for VO members to have a Flexible workplace
- I6 (4.73): ICTF has a strong degree of Task-Technology fitness
- I9 (4.51): ICTF having a high Security characteristic
- I7 (4.43): ICTF is flexible to be programmed in the way that increases the level Efficiency

• I4 (4.40): Each Individual in VO has a specific access level that in manageable

To have a better understanding that would be useful to see the mutual factor in the EFQM model; but this is one of the most unique characteristics of this study's suggested Virtual Organization Excellence model (VOEM). In other words EFQM 2013 does not include ICT frame works as one of the main enables and there is sub-criteria (4d) dedicated to use of technology in organizations. Now before the comparison between EFQM 2013 and VOEM from ICT point of view we want to discuss about the reason and necessity of having a main factor as ICT framework in VO.

Still it is not so long ago that after the dramatic rise of information technology this brought an enormous revolution in expansion of the World Wide Web. Then it was an area for creation of information and communication infrastructures such as: satellites, personal computers, computer networks, internet, e- mail… that provided a basis for development of virtual organizations. Virtual organization more than anything was the results of expanding the use of information and communication technology (ICT) and made it possible to imagine the new organizational models.

ICT frameworks helped organizations to increase worker participation and create a possibility of multinational corporations. One of the significant developments in organizational design is the introduction of team-based structures which was the first image of virtual organization, of which virtual teams were the building blocks. Advances in technology facilitate communication and the sharing of information among team members. But, with members in multiple time zones, logistics are more complex.

So Virtual organization as what we see and know born to have access to international talents and resources with help of ICT frameworks. Also in most famous Virtual Organization models, ICT is taking the main role! The first model is ISSAAC by Travica in 2005 that accounts both for degree of virtuality and for the VO characteristics. ISSAAC dimensions are conceptualized as follows.

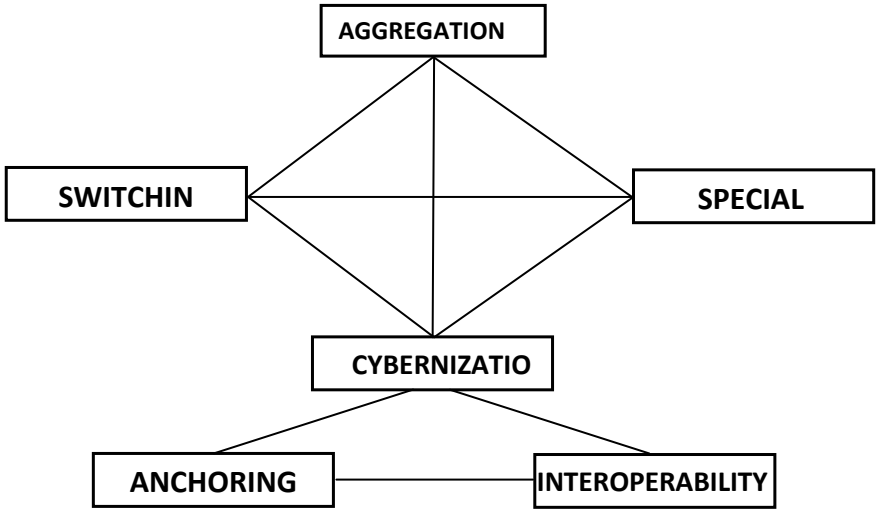


Figure 71: The ISSAAC Model of Virtual Organization

In this model Information and communication technology (ICT) was revealed through Cybernization, Travica indicated that Cybernization is playing the Key Role in the model and referred that an organization's existing in the space is created by information systems and electronic information flows (cyber space or electronic space). Cybernization reflects the necessary role of IT in VO, accounting for both the extent of IT usage and the involvement of an organization in creating and using computer networks, EDI, technologies for B2B e-commerce, and various relevant information systems.

Beside ISSAAC, there is another model that indicated ICT as the center of the model, which signifies its central role in VO. IT is critical for carrying out production process at locales of VO as well as linking tasks that are spatially dispersed both through transfer of the work matter and accompanying communication of workers.

In addition, IT supports VO structure (the aspect of electronic structure in the research model) whose distinctive elements are the linkages between VO parts dispersed in space (Lucas, and Jack Baroudi, 1994). IT, furthermore, supports organizational information which can mirror social organization (cf. Nohria and Berkley, 1994).

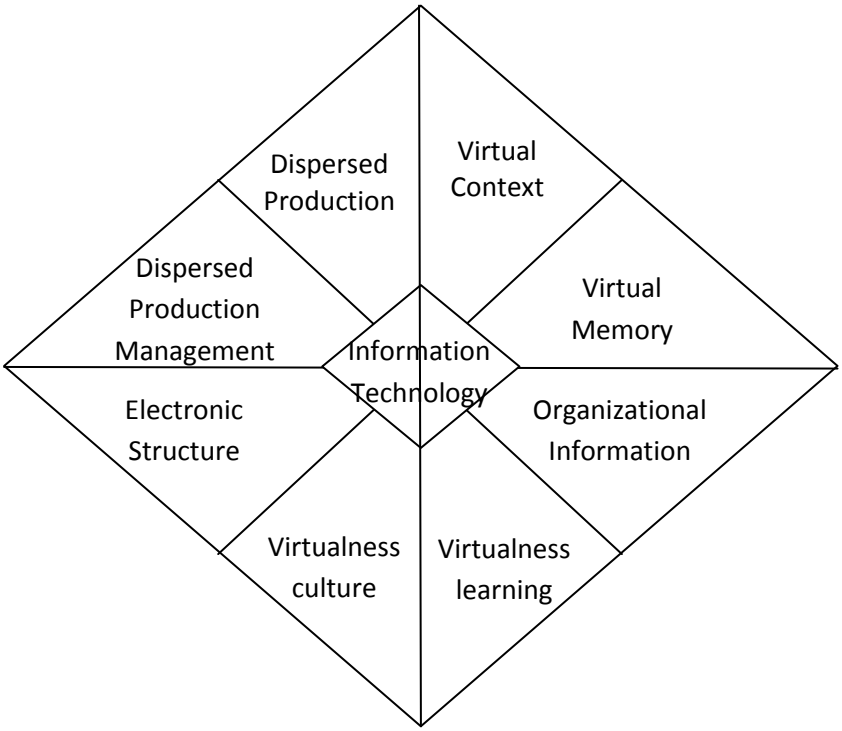


Figure 72: IT as an enabler VO model

Based on Literature review, Field experiment, Interviews and survey results, ICT framework became one of the main and fundamental concepts in this study's suggested Virtual Organization Excellence model (VOEM). Now it is time to conduct a comparison between EFQM 2013 and VOEM. As we mentioned above ICT is not among the main factors in EFQM 2013 but in the 4th factor called "Partnership and Resources" there is a sub-criteria dedicated to use of Technology in a productive organization.

EFQM Partnership and Resources Definition:

Excellent organizations plan and manage external partnerships, suppliers and internal resources in order to support policy and strategy and the effective operation of processes. During planning and whilst managing partnerships and resources they balance the current and future needs of the organization, the community and the environment.

Although there is not a clear manifestation of technology in the definition of this factor but one of the sub-criteria have been dedicated to this issue as below:

4d. Technology is managed to support the delivery of strategy. This may include:

I. Developing a strategy for managing technology that supports the organizations policy and strategy;
II. Identifying and evaluating alternative and emerging technologies in the light of their impact on business and the society;
III. Managing the technology portfolio including the identification and replacement of out dated technology;
IV. Exploiting existing technology;
V. Developing innovative and environmentally friendly technology (i.e. conserving energy and resources, minimization of waste and emissions, encouraging recycling and re-use);
VI. Using Information and Communication Technologies to support and improve the effective operation of the organization;
VII. Using technology to support improvement.

The most important difference is in the heart of these 2 models and that is “The perspective toward technology”. In the VOEM we specifically focused on the Information and communication technology as the main enabler of a VO while in EFQM model there is a more global approach to the kind of technology in the organization which means any thechnology that could help an organization to achieve its goals!

In the first statement in 4d section of EFQM Excellence mode indicated the enabling role of technology to achieve the strategic goals. We believe that a technology just by itself could not get an organization moving toward excellence but the process and the way to use that will make this happen. So we covered this statement in the Process section:

P6 (4.54): Process has been designed to fulfill VO’s ultimate strategy

Again in the analysis the rest of the sentences this is again getting back to the kind of perspective we used in the developing of VOEM. We tried to categorize sentences in the way that each section includes the most relative statements relating to the functor of that role or task. As In this case the functor for this second sentence would be the Leader of a Virtual organization so we mentioned it there:

L3 (3.63): Choosing the most appropriate technology (Task- technology fit) for VO.

In short, we could say that ICT factor in VOEM is a totally new element compare to EFQM. This difference and be interpreted based on the main characteristic of virtual organizations. EFQM is designed to help traditional organization to get closer to excellence and that is quite normal not to emphasize on technology. Although EFQM mentioned about the importance of technology in the firms and dedicated a sub-criteria to it but this sub criteria considering all the technologies that an organization use not specifically ICT. But in VOEM we found out that this factor is one of the most important factors which help a VO to get closer to ultimate excellence.

4.3.3.3. Hypothesis 3: Positive effect of Teams on VO excellence

As predicted, the analysis of results indicates support for the positive effect of Teams on the Virtual organization productivity and excellence. As we discussed before according to statistical results, in this case significance rate was less than 0.05. This means that Teams are an effective factor in Virtual organization productivity and could be part of its Excellence model.

NO	Statements	Mean Rank
T5	Creating a united team spirit & belonging which prevents isolation and detachment with providing feedback to leader and other members about their performance using communication tools like text, chat, email and collaborative software systems, videoconferencing, preparing face-to-face meeting, voicemail messages.	5.51
T8	Having communication, awareness, and sensitivity between members despite cultural differences, understanding how cultural perspectives influence work and collaboration, and adjusting communication approach based on those differences, when appropriate.	5.33
T7	VO members must have ability to analyze, manage data, plan, and organize self work to correspond to team schedules, report progress and problems, monitor and control costs, take actions to get back on track, document and share learning.	5.24
T9	Having self management skills like: ability to establish personal and professional priorities and goals, recognizing opportunities for individual learning and growth, taking the initiative to change working methods and processes, social adequacies. Being adaptable, plan-ahead, well organized, flexible, low levels of neuroticism, resilient, extroverted, self-confident, and open to new experiences highly self-motivated, developing plans to meet those goals, executing plans, multi-tasking, influential, strong sense of urgency and drive.	5.04
T1	Having an interactive relationship between employees and leaders makes possible to have clear understanding of role, see that their opinions are taken into account when defining organizational objectives, and they are involved in decision making and setting goals collectively.	4.98
T4	Creating stable trust that means internalization of VO norms and practices and willingness to cooperate, share, and give feed back to others despite of high turnover of VO members	4.90
T6	Create a unique VO culture beyond gender, age, ethnic background, personal tastes or preferences, language, theoretical framework, history, individual assumptions, values, biases, goals, styles.	4.85
T2	A powerful reward system structure in which people are rewarded, recognized and cared for their achievements at work based on: meeting customer's and the organization's objective, skill-based criteria, learn the necessary new skills.	4.69
T3	Creating a special training (just-in-time learning) rules and motivations like: self managing skills, intercultural communication and meeting, trust building, project management skills, ICT framework training, language and balance between Technical and Interpersonal Skills, based on each position competences	4.46

Table 105: Team importance means per question

The second conclusion of this hypothesis and the questionnaire that we developed to asses this factor is to clarify what we mean by "Teams are important in VO's productivity"! And what "Teams" factor stands for in reality. According to the Research methodology and based of "Extensive Literature review" we extracted the most important statement targeted what are the characteristics of excellent Teams in a Virtual Organization. Based on the frequency of

this statements and Field experiment, Interviews and Expert meeting we summarized all those statement to, first cover all the point and second, remain in the less than 10 (to keep the entire questionnaire leveled).

At the next step we assigned 9 questions to Teams factor which basically was the most important and frequent Teams characteristics in an excellent Virtual Organization. Based on Result analysis of the 352 experts we tried to rank these statements. Table above shows that results of Friedman test on 9 Teams questions and ranking the results to see which one was indicated the most important by experts.

According to the fact that these questions were designed in Excellence models self assessment format, it is a bit long to see each main point clearly , so here we summarized the essence of each these 9 statements to convey a more sharp image:

Teams:

- T5 (5.51): Having a sense of unity and prevent any Isolation prevent
- T8 (5.33): Create a collaboration Culture
- T7 (5.24): Existing and developing team working personal skills in members
- T9 (5.04): Existing and developing self management skills
- T1 (4.98): Having a strong feedback and Knowledge sharing
- T4 (4.90): Existing and developing a trustful environment
- T6 (4.85): Existing and developing a unique team culture (out of barriers)
- T2 (4.69): Having a fair Reward system which works based on achievement criteria
- T3 (4.46): Existing a train & development system to empower members with all required skills

To have a better understanding we will mention the mutual factor in the EFQM model. In this case we have exactly the same factor called People. In the Virtual Organization Excellence model (VOEM) we found out that the Leader would be the person who is setting VO's Vision, mission and strategy or at least this person is the main focal point for all the decisions in this regard.

EFQM People Definition:

Excellent organizations manage, develop and release the full potential of their people at an individual, team-based and organizational level. They promote fairness and equality and involve and empower their people. They care for, communicate, reward and recognize, in a way that motivates staff and builds commitment to using their skills and knowledge for the benefit of the organization.

EFQM Policy and Strategy Sub-criteria

People cover the following five criterion parts that should be addressed.

- **3a.** People resources are planned, managed and improved.

- **3b.** People's knowledge and competencies are identified, developed and sustained.
- **3c.** People are involved and empowered.
- **3d.** People and the organization have a dialogue.
- **3e.** People are rewarded, recognized and cared for.

To have a better understanding of VOEM, that would be helpful to conduct a comparison one by one. EFQM in 3a statement indicated the 3 most important steps to manage the Human resources of an organization. On the other hand we divided these 3 steps and to be clearer for organizations and assessor put them in different sub-criteria. As figure below demonstrated we suggest this equation: 3a ~ L7 + T6 + T3 + T7.

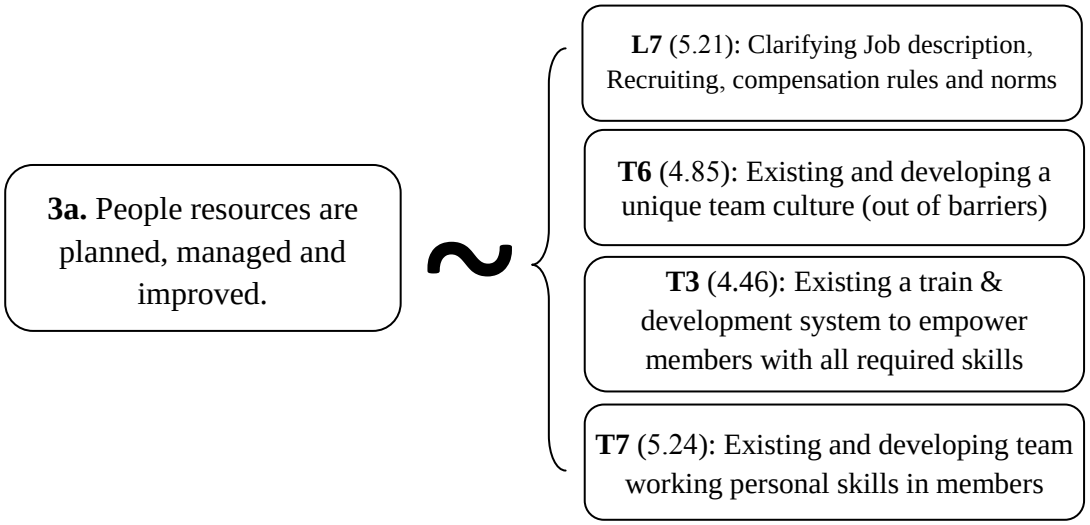


Figure 73: EFQM and VOEM equation for 3a sub-criteria

The statement 3b indicated that People's knowledge and competencies are identified, developed and sustained. Although EFQM in this statement put stress on the importance of Knowledge management in the organization but as Knowledge is one of the resources in an organization and specifically in a Virtual firms Knowledge functions as bold of an alive body so in VOEM we decided to assign one of the main factors to Knowledge and all the content that created and used in a VO. So to have an equation it is better to say that 3b will be presented trough:

K1 (4.52): Identifying different kind of data and putting into VO framework
K3 (3.70): Create a complete data ecosystem inside and outside of VO
K5 (3.49): Create data mining, use and sharing culture
K2 (2.81): Having a data categorization process to prevent redundancy and un clarity

EFQM model in 3c sub-criteria indicates that “People are involved and empowered”. Although we can find some part of this function in 3a but in this study’s suggested Virtual Organization Excellence model (VOEM) we have more than one sub-criterion for this function and the suggested equation would be like 3c ~ T5 + T8 + T3.

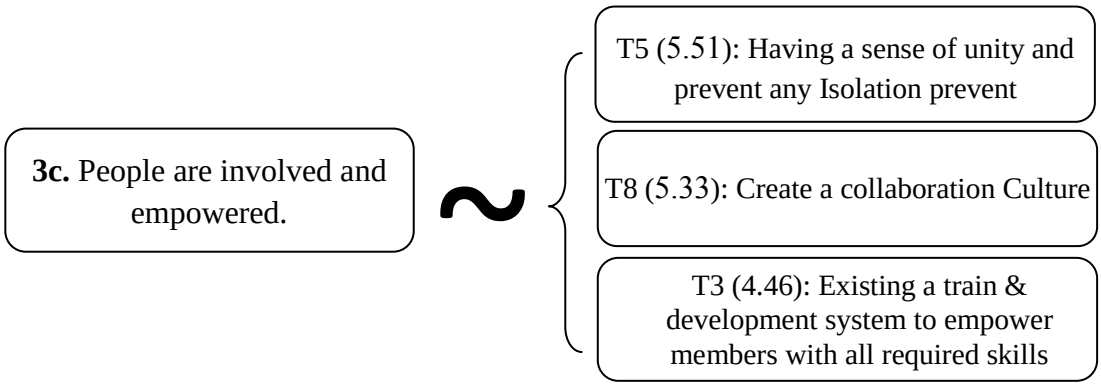


Figure 74: EFQM and VOEM equation for 3c sub-criteria

One of the most important sub-criteria in People factor would be 3d which indicated that "People and the organization have a dialogue". While this is normally a challenge in the traditional organizations to create a process or create a channel to make the dialog possible between human resource and top level managers but this challenge is much more bigger in a Virtual Organization that face to face meeting are happen so rare.

As we discussed in chapter 1, the necessity of dialog between Leaders (managers) and teams is so high and an excellence Virtual organization must build a culture for this and keep it as one of the most important process. The challenge in developing VOEM was to choose who is responsible for this function and in the expert meeting it has been decided that Virtual organization Leader must be the first entity to start this process and establish a process for it, so this function have been covered in the Leadership factor. So the equation here would be 3d ~ L8.

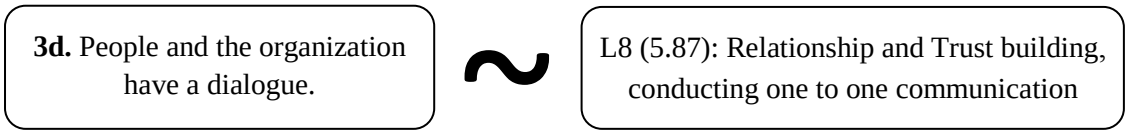


Figure 75: EFQM and VOEM equation for 3d sub-criteria

The last sub-criteria in EFQM model and People section is 3e which indicates that "People are rewarded, recognized and cared for". While Extensive Literature review and expert meeting for suggested Virtual Organization Excellence model (VOEM) we also found this function as one of the most important one and there is a specific sub-criterion for it there. T2 with a mean score of 4.69 indicates that having a fair Reward system which works based on achievement criteria is one of the qualities of an excellent Virtual organization and the equation would be 3e ~ T2 .

In short, Team criteria in VOEM are similar to the mutual factor in EFQM but it is much wider in VOEM compare to EFQM. For example as we mentioned above some of the statements in team factor of EFQM have been covered by 3 factors in VOEM like, Leadership, Teams and Knowledge.

4.3.3.4. Hypothesis 4: Positive effect of Knowledge on VO excellence

As predicted, the analysis of results indicates support for the positive effect of Knowledge on the Virtual organization productivity and excellence. As we discussed before according to statistical results, in this case significance rate was less than 0.05. This means that Knowledge is an effective factor in Virtual organization productivity and could be part of its Excellence model.

The second conclusion of this hypothesis and the questionnaire that we developed to asses this factor is to clarify what we mean by "Knowledge management is important in VO's productivity"! And what "Knowledge" factor stands for in reality. According to the Research methodology and based of "Extensive Literature review" we extracted the most important statement targeted what is Knowledge and content management in a Virtual Organization. Based on the frequency of this statements and Field experiment, Interviews and Expert meeting we summarized all those statement to, first cover all the point and second, remain in the less than 10 (to keep the entire questionnaire leveled).

At the next step we assigned 6 questions to Knowledge factor which basically was the most important and frequent Knowledge and content management function in an excellent Virtual Organization. Based on Result analysis of the 352 experts we tried to rank these statements. Table below shows that results of Friedman test on 6 Knowledge questions and ranking the results to see which one was indicated the most important by experts.

NO	Statements	Mean Rank
K1	Identify and input data from projects, communications, environment, staff experience, feedback, share recourses (like calendars), teams, customers, suppliers, competitors, standards, lessons learned, benchmarking, suggestions, innovations , scientific documents, ...	4.52
K3	All members are part of creating knowledge; They use recent data and reflect the results after finalizing the projects. These new data get identified and categorized for future improvement	3.70
K5	Enrich data and knowledge by making it a must to use and share data by any individual or group	3.49
K6	Creating a transparent VO which each member can "see" and "feel" what is happening above and around.	3.46
K4	Assign each VO member a level or permission that shows who can access what in knowledge database.	3.03
K2	Data categorization are reviewed to prevent any redundancy and share openly via all channels inside VO.	2.81

Table 106: Knowledge importance means per question

According to the fact that these questions were designed in Excellence models self assessment format, it is a bit long to see each main point clearly , so here we summarized the essence of each these 6 statements to convey a more sharp image:

Knowledge:

- K1 (4.52): Identifying different kind of data and putting into VO framework

- K3 (3.70): Create a complete data ecosystem inside and outside of VO
- K5 (3.49): Create data mining, use and sharing culture
- K6 (3.46): Transparency in knowledge ecosystem
- K4 (3.03): Having access to different kind of Knowledge for all VO members (Levels)
- K2 (2.81): Having a data categorization process to prevent redundancy and un clarity

Although there is not such a factor as Knowledge management in the EFQM but as we discussed before in the previous section there are 5 sub-criteria who have been dedicate to cover this issue but in different main criteria. In Leadership factor there is **1e** statement which indicates that "Leaders identify and champion organizational change, measuring and reviewing the effectiveness of changes and sharing the knowledge gained". Also in people's factor the **3b** statement indicates that "People's knowledge and competencies are identified, developed and sustained". In the same criteria the **3d** statement clarifies that "People and the organization have a dialogue, identifying and ensuring opportunities to share best practice and knowledge".

In the same way inside of Partnerships & Resources factor the 4a sub-criteria indicates that "External partnerships are managed, ensuring cultural compatibility and the sharing of knowledge with partner organizations". And finally in the same factor there is 4e sub-criteria that have more than one statement to support the importance of Knowledge management in an organization as below:

Information and knowledge are managed:

- Developing a strategy for managing information and knowledge that supports the organizations policy and strategy;
- Identifying the organizations information and knowledge requirements;
- Collecting, structuring and managing information and knowledge in support of policy and strategy;
- Providing appropriate access, for both internal and external users, to relevant information and knowledge;
- Using information technology to support internal communication and information and knowledge management;
- Assuring and improving information validity, integrity and security;
- Seeking to acquire, increase and use knowledge effectively;
- Generating innovative and creative thinking within the organization through the use of relevant information and knowledge resources.

In short, this criteria is totally new in VOEM compare to EFQM. To have this factor in the model we used the extensive literature review and analyzed the findings in the interviews and expert meeting. Beside this, we observed the importance of such a factor in field experiment. Based on what we mentioned about most of the content of this factor is new but the rest would be quite similar to sub-criteria in people factor in EFQM.

4.3.3.5. Hypothesis 5: Positive effect of Environment on VO excellence

As predicted, the analysis of results indicates support for the positive effect of Environment (Stakeholders, customers, supplier, partner, etc.) on the Virtual organization productivity and excellence. As we discussed before according to statistical results, in this case significance rate was less than 0.05. This means that Environment (Stakeholders, customers, supplier, partner, etc.) is an effective factor in Virtual organization productivity and could be part of its Excellence model.

The second conclusion of this hypothesis and the questionnaire that we developed to asses this factor is to clarify what we mean by "Environment (Stakeholders, customers, supplier, partner, etc.) management is important in VO's productivity"! And what "Environment (Stakeholders, customers, supplier, partner, etc.)" factor stands for in reality. According to the Research methodology and based of "Extensive Literature review" we extracted the most important statement targeted what is Environment (Stakeholders, customers, supplier, partner, etc.) management in a Virtual Organization. Based on the frequency of this statements and Field experiment, Interviews and Expert meeting we summarized all those statement to, first cover all the point and second, remain in the less than 10 (to keep the entire questionnaire leveled).

At the next step we assigned 9 questions to Environment (Stakeholders, customers, supplier, partner, etc.) factor which basically was the most important and frequent Environment management function in an excellent Virtual Organization. Based on Result analysis of the 352 experts we tried to rank these statements. Table below shows that results of Friedman test on 9 Environment questions and ranking the results to see which one was indicated the most important by experts.

	Statements	Mean Rank
E2	Providing VO with detailed information about market, competitors, legal and environmental issues and all the partners comments and feedbacks	5.32
E5	Analyzing market to develop new products or services ahead of competitors.	5.20
E7	VO must have common inner criteria with partners like: matching goals, algorithms, skills and capabilities, technical and economical preferences, common collaborating infrastructure and commitment to provide best quality	5.16
E4	Creating an access point for customers in VO's portal to see and comment in different phase of project.	5.04
E6	Customers get full 24/7 support after purchasing their product or service.	5.00
E9	Provide all partners or suppliers with an access point in VO's portal to share knowledge	5.00
E3	Plan customer's full experience from ordering and assigning the best team for the project to final delivery.	4.90
E8	Having common outer criteria with partners like: cost requirement, collaboration history, reliability indicators, and readiness to join the collaborative process.	4.89
E1	Comparing and revising quality of the products or service offered to customer with competitors.	4.50

Table107 : Environment importance menas per question

According to the fact that these questions were designed in Excellence models self assessment format, it is a bit long to see each main point clearly , so here we summarized the essence of each these 9 statements to convey a more sharp image:

Environment

- E2 (5.32): I VO environmental market and legal issues get analyzed constantly.
- E5 (5.20): Developing new products conducted based on environmental market analysis.
- E7 (5.16): In selecting VO's partners, inner alliance is an essential indicator.
- E4 (5.04): Each Customers have a customized access point in VO portal .
- E6 (5.00): All customers get 24/7 support from VO.
- E9 (5.00): Partners and suppliers have a customized access point in VO portal.
- E3 (4.90): VO designed 360 degree customer experience from order to delivery.
- E8 (4.89): In selecting VO's partners External alliance is an essential indicator.
- E1 (4.50): Reviewing and revising products is based on customers and environment data

To have a better understanding we will mention the mutual factor in the EFQM model. In this case we have somehow the same factor called Partnerships and Resources. In the Virtual Organization Excellence model (VOEM) we found out that the Environment has a tremendous amount of affect on this kind of organization. As we discussed in chapter 1, VOs are agile to cope with the incredibly fast moving environment that they exist in. They need to be flexible because each of the environmental elements has an impact of the project process and depend on each this kind of organization must be ready to respond.

As we also mentioned in the chapter 2 (part 2) that in the process of interviews and expert meeting the team decided to integrate all the environmental elements that has effect on the VO in the same group and name it Environment. The Environmental factor includes all the Stakeholders, customers, supplier, partner, market and etc. around a Virtual organization. On the other hand EFQM have them in more than one factor but most of the focus is on the 4th factor.

EFQM Partnerships and Resources Definition:

Excellent organizations plan and manage external partnerships, suppliers and internal resources in order to support policy and strategy and the effective operation of processes. During planning and whilst managing partnerships and resources they balance the current and future needs of the organization, the community and the environment.

EFQM Partnerships and Resources Sub-criteria:

- 4a. External partnerships are managed.
- 4b. Finances are managed.
- 4c. Buildings, equipment and materials are managed.

- 4d. Technology is managed.
- 4e. Information and knowledge are managed.

In the 4th factor of EFQM the most similar statement to VOEM environment is 4a as this says "External partnerships are managed" and the only difference is that this sub- criteria just focused on Partners. The Management word has a huge meaning and in one perspective can be equal to 3 statements from Environment factor as below:

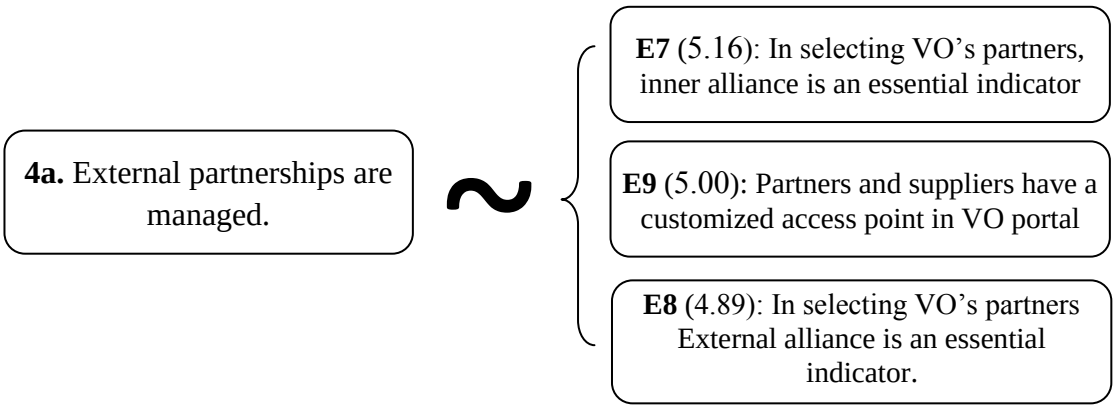


Figure 76: EFQM and VOEM equation for 4a sub-criteria

As the 4th factor also indicates the resource management in organizations, a sub-criteria like 4b which says "Finances are managed" is predictable here. We don't have this characteristic in the environment factor but in the Result category we have somehow the same meaning in R4 (5.25): VO reviews financial results, profitability, growth and market constantly. So as the equation we could say that 4b ~ R4.

4c pointed to the most normal characteristic of a traditional organization and at the same time the only characteristic that a virtual organization does not have. All the equipment and material that needs to be managed in a virtual organization is ICT frame work, this is the platform that a VO exist on it.

Virtual organization does not necessarily have any physical presence or permanence. As we mentioned above in chapter 1 ,Virtual can be defined as not physically existing as such but made by software to appear to do so, in other words unreal but looking real. This definition precisely outlines the leading principle of this unconventional organization, which holds the form of a real (conventional) corporation from the outside but does not actually exist physically and implicates an entirely digital process relying on independents web associates. Thus, virtual organizations are centered on technology and position physical presence in the background. Virtual organizations possess limited physical resources as value is added through (mobile) knowledge rather than (immovable) equipment.

So there is not a mutual sub-criteria in this study's suggested Virtual Organization Excellence model (VOEM) and the equation would be 4c ~ Ø.

Regarding the 4d sub- criteria we explained in the previous section when we were discussing about the ICT framework effect on Excellence and virtuality in the Virtual organization so the equation would be like 4d ~ I (all).

Regarding the 4e sub- criteria we explained in the previous section when we were discussing about the Knowledge management effect on Excellence and virtuality in the Virtual organization, so the equation would be like 4d ~ K (all).

In short, Environment factor in VOEM is a combination of statements emphasizes on the importance of stakeholders, customers, supplier, partner, and market. In EFQM there is a factor called Partnerships and Resources but not quite in the same area. This factor in EFQM has been covered by ICT, Results and Knowledge in VOEM.

4.3.3.6. Hypothesis 6: Positive effect of "Process" on VO excellence

As predicted, the analysis of results indicates support for the positive effect of Process on the Virtual organization productivity and excellence. As we discussed before according to statistical results in this case, significance rate was less than 0.05. This means that Process is an effective factor in Virtual organization productivity and could be part of its Excellence model.

The second conclusion of this hypothesis and the questionnaire that we developed to asses this factor is to clarify what we mean by "Process management is important in VO's productivity"! And what "Process" factor stands for in reality. According to the Research methodology and based of "Extensive Literature review" we extracted the most important statement targeted what is Process management in a Virtual Organization. Based on the frequency of this statements and Field experiment, Interviews and Expert meeting we summarized all those statement to, first cover all the point and second, remain in the less than 10 (to keep the entire questionnaire leveled).

	Statements	Mean Rank
P3	There are open and transparent formal communication procedures within staff, customers, and suppliers	5.10
P1	Processes designed and get managed in order to create best usage of resources, reduce staff time and costs, distribute information and knowledge, cope with location and time zone barriers, reducing and optimizing physical, economic and financial resources, find out employee opinions, and represent flatness and agility and create high degree of cohesion in VO.	4.71
P7	Customers, partners, suppliers play an important roles in VO process at different stage.	4.62
P2	Comprehensive documentation of work methods and organizational processes in all angels.	4.55
P6	Deploying policy and strategy through processes to make sure every member works toward VO's mission and objectives.	4.54
P4	Processes are being improved as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders.	4.47
P8	Placing a systems of indicators to revise changes in processes	4.09
P5	Processes are fitting Task-Technology-Structure concept of VO.	3.92

Table 108: Process importance means per question

At the next step we assigned 8 questions to Process factor which basically was the most important and frequent Process management function in an excellent Virtual Organization.

Based on Result analysis of the 352 experts we tried to rank these statements. Table above below shows that results of Friedman test on 8 Process questions and ranking the results to see which one was indicated the most important by experts.

According to the fact that these statements were designed in Excellence models self assessment format, they are a bit long to convey main point clearly , so here we summarized the essence of each these 9 statements to convey a more sharp image:

Process

- P3 (5.10): Process in VO is clear and transparent.
- P1 (4.71): VO process makes resources and time management possible.
- P7 (4.62): Interactions with all the stakeholders are in the best fit.
- P2 (4.55): All the VO process has been passed the documentation procedure
- P6 (4.54): Process has been designed to fulfill VO's ultimate strategy.
- P4 (4.47): VO process getting reviewed periodically using innovation.
- P8 (4.09): VO placed detectors to recognize process need to get review.
- P5 (3.92): Process design based on ICTF to be Task- technology fit.

To have a better understanding we will mention the mutual factor in the EFQM model. In this case we have exactly the same factor called Processes. Here we will mention more details about this factor.

EFQM Processes Definition:

Excellent organization's design, manage and improve processes in order to fully satisfy, and generate increasing value for, customers and other stakeholders.

EFQM Processes Sub-criteria:

- 5a. Processes are systematically designed and managed.
- 5b. Processes are improved, as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders.
- 5c Products and Services are designed and developed based on customer needs and expectations.
- 5d Products and Services are produced, delivered and serviced.
- 5e Customer relationships are managed and enhanced.

Here we will start from analysis of the definitions. Based on the 8 statements in this study's suggested Virtual Organization Excellence model (VOEM) questionnaire, and comparing to the EFQM proposed definition for this factor we could clearly see the difference. While EFQM emphasized on the value that process make for the customers and stakeholders in the VOEM we clearly have sub-criteria for customers, partners and resources. This difference

came from the fact that in virtual organizations process are implemented trough the ICT framework and these processes could create added value for all the members of a Virtual organization.

In the sub-criteria, 5a indicates that processes are systematically designed and managed. This sentence formed from 2 parts: designing process and managing them. While designing is clear, managing is more than only one words and contains couple of functions. In this study, based on the Extensive Literature review we detected more than one sentences instead of just saying Management!

As we mentioned in chapter 1 process in Virtual organization are implemented based on ICT framework so designing and even development and managing them is somehow different from the traditional organization. There is a great need to have a integration between ICT framework and process of a VO and this is the main reason why there is a sub-criteria called P5(3.92) in the VOEM proposed model which indicates that "Process design based on ICTF to be Task- technology fit". Back to the 5a the equation for these sub-criteria would be as below:

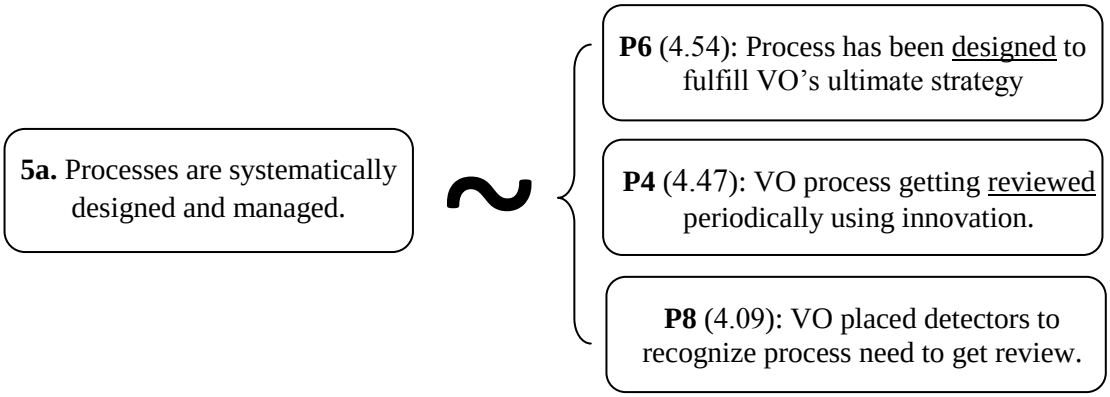


Figure 77: EFQM and VOEM equation for 5a sub-criteria

The second sub-criteria in this section is 5b which indicates that "Processes are improved, as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders". The first part of this statement implies the management of process which has been covered previously in 5a. So the main point of this statement would be how process can create value for customers and stakeholders and that is extremely important for productivity and excellence of an organization. We could say the same thing for Virtual organizations and that is the reason why we have somehow the same sub-critera in this position and we could suggest this equation like 5b ~ P6 + P7.

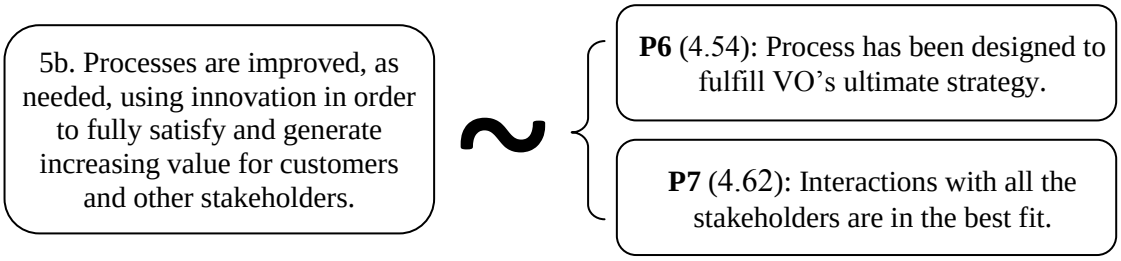


Figure 78: EFQM and VOEM equation for 5b sub-criteria

Although this factor is focusing of Process but the 5c sub-criteria focuses on Products and Services and the way they designed and developed based on customer needs and expectations. In this study's suggested Virtual Organization Excellence model (VOEM) and in the process factor , based in the extensive literature review and expert meeting we decided to keep the result of process away from this factor and here only focus on the way that Process need to be in order to get closer to the productivity and excellence in virtual organizations.

Despite what have been said, in VOEM we have other factors focusing on the way that products need to get designed. Literature review and field experiment in Tstab virtual organization made it clear for us that Environment is the factor that we must include the factors regarding the product and services. Figure below indicates the equation between these sub-criteria in EFQM and VOEM models and the mathematical equation would be: 5c ~ E5 + E1.

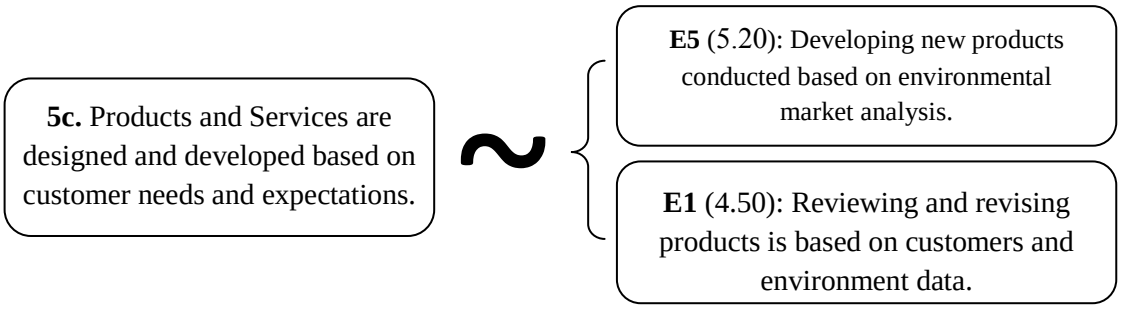


Figure 79: EFQM and VOEM equation for 5c sub-criteria

5d sub-critera indicates that "Products and Services are produced, delivered and serviced" and 5e which indicated the customer relationships are managed and enhanced must be analyzed together in other words this statements focused on the customer experience, product delivery and support after it. Based on Literature review , field experiment and expert meeting in this study's suggested Virtual Organization Excellence model (VOEM) we mentioned this statement in 3 sub criteria in Environment factor as below and the equation would be 5d + 5e ~ E6 + E4 + E3.

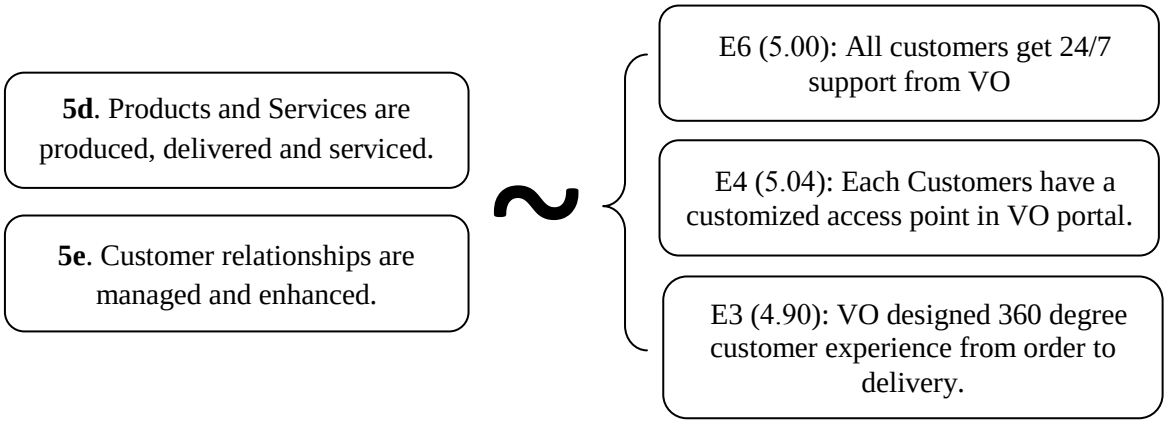


Figure 80: EFQM and VOEM equation for 5d, 5e sub-criteria

In short we could say that this factor in VOEM is somehow the same with the Process factor in EFQM. Statements in this factor in EFQM have been presented by Process and Environment in VOEM.

4.3.3.7. Hypothesis 7: Positive effect of "Results" on VO excellence

As predicted, the analysis of survey results indicates support for the positive effect of "Results" on the Virtual organization productivity and excellence. As we discussed before according to statistical results in this case, significance rate was less than 0.05. This means that "Results" is an effective factor in Virtual organization productivity and could be part of its Excellence model.

The second conclusion of this hypothesis and the questionnaire that we developed to asses this factor is to clarify what we mean by ""Result" is important in VO's productivity"! And what "Results" factor stands for in reality. According to the Research methodology and based of "Extensive Literature review" we extracted the most important statement targeted what is "Results" in a Virtual Organization. Based on the frequency of this statements and Field experiment, Interviews and Expert meeting we summarized all those statement to, first cover all the point and second, remain in the less than 10 (to keep the entire questionnaire leveled).

At the next step we assigned 9 statements to "Results" factor which basically was the most important and frequent "Results" function in an excellent Virtual Organization. Based on Result analysis of the 352 experts we tried to rank these statements. Table below shows that results of Friedman test on 9 "Results" questions and ranking the results to see which one was indicated the most important by experts.

ID	Statements	Mean Rank
R4	Checking financial results, profitability (costs versus revenue), improvement of products or services and sales per employee, market share growth.	5.25
R5	Observe any change in quality of leadership roles execution, virtual team management, coaching new team members, suggesting internal quality improvement strategies opportunities for promotion	5.18
R9	Maximizing the diversity of skills, access to a greater pool of talent optimizing the fit of individuals to teams, increase trust, quantifiable measures of evaluating individual performance on VT	5.17
R7	Any change in satisfaction indicator between members like role stressors, happy relation with their supervisors, committed to VO, levels of satisfaction with peers is important.	5.13
R6	Review environmental feedback like any change in number of customers, suppliers, partners, competitors, and their satisfaction.	5.12
R2	Checking VO's policy and strategy to see if they are helping organization to get to its ultimate goal	4.98
R1	Analyzing VO results like quality management, adherence to preset budget, lower costs, higher productivity, accuracy of financial contracts, development of new business, mission clarity.	4.82
R3	Any increase or decrease in staff turnover, degree of task flexibility, accomplishment of assigned tasks, task efficiency , commitment and involving to the work is reviewed carefully	4.71
R8	Any higher performance in production timing from order to delivery, improvement in customize product or service, decrease resources consumption, reduced staff time and costs, improve process efficiency and productivity.	4.64

Table 109: Results importance means per question

According to the fact that these statements were designed in Excellence models self assessment format, they are a bit long to convey main point clearly , so here we summarized the essence of each these 9 statements to convey a more sharp image:

Results:

- R4 (5.25): VO reviews financial results, profitability, growth and market constantly
- R5 (5.18): VO reviews Leadership and management team performance results constantly
- R9 (5.17): VO reviews indicators like diversity of skills and Trust in teams constantly
- R7 (5.13): VO reviews indicators like role stressors and level of satisfaction constantly
- R6 (5.12): VO reviews environmental feedback and Stakeholders feedback constantly
- R2 (4.98): VO reviews the fitness of strategy in ultimate VO goal constantly
- R1 (4.82): VO reviews indicators like productivity and performance constantly
- R3 (4.71): VO reviews indicators degree of staff turnover, task flexibility constantly
- R8 (4.64): Production time, Resource consumption, Process efficiency

To have a better understanding we will mention the mutual factor in the EFQM model. In this case we have 4 factors with the same target called Customer Results, People Results, Society Results and Key Performance Results. Here we will mention more details about these factors.

EFQM Customer Results Definition:

Excellence organizations comprehensively measure and achieve outstanding results with respect to their customers.

EFQM Customer Results Sub-criteria:

- 6a. Perception Measures.
- 6b. Performance Indicators.

EFQM People Results Definition:

Excellent organizations comprehensively measure and achieve outstanding results with respect to their people.

EFQM People Results Sub-criteria:

- 7a. Perception Measures.
- 7b. Performance Indicators.

EFQM Society Results Definition:

Excellent organizations comprehensively measure and achieve outstanding results with respect to society.

EFQM Society Results Sub-criteria:

- 8a Perception Measures.
- 8b. Performance Indicators.

EFQM Key Performance Results Definition:

The measures are key results defined by the organization and agreed in their policy and strategies.

EFQM Key Performance Results Sub-criteria:

- 9a Key Performance Outcomes.
- 9b Key Performance Indicators.

This is 4 factor addressing quite the same issue of " the importance of the paying attention to the results of the excellence process in the organization" .EFQM divided this to 4 sections to emphasize on the importance of the results in each section of the customer, people and society and the last one is the results of the key performance of all the organization Depending on the purpose and objectives of the organization some of the measures for Key Performance Outcomes may be applicable to Key Performance Indicators and vice versa.

In the process of developing this study's Virtual Organization Excellence model (VOEM), we came up with different evidence of the importance of Results in the virtual organization. Based on Extensive Literature review, field experiment and interviews and after a discussion in the expert meeting team decided to have only one factor targeting results instead of 3 or 4.

One of the benefits of this centralization would be able to link between results of different enablers. On the other hand having more than one "Result" factor would create a decentralized definition of results and as virtual organization mostly are agile and small this decentralization would affect their flexibility. So we decided to have only one factor implying Results in the VOEM. Here we are going to create link between sub- criteria in the EFQM model and VOEM.

In the 6^{th} factor there is 2 sub criteria 6a and 6b which indicates customer results perception measures and customer results performance indicators. On the other hand as we mentioned above in the VOEM we showed the importance of customer results in 2 factors, Environment and results.

To be more precise, 6a would be in when a customer indicates the expectations and milestone and in virtual organization (E4) they are able to do that via and access point that they can create in the VO portal and describe what they want as the product. They also can choose between products and services that already exist and this by itself can indicate the exact expectation that they have. In the same manner after delivery of the products Virtual organization offers a 24/7 support (E6) which means that they can monitor their performance very closely and Review they product that they made and revise the production process if it needed (E1).

And as the final steps all the services and products results most get reviewed by customers and stakeholders to have the impact of the vision and process of production (R6). So the equation would be 6a + 6b ~ E4 + E6 + E1+ R6.

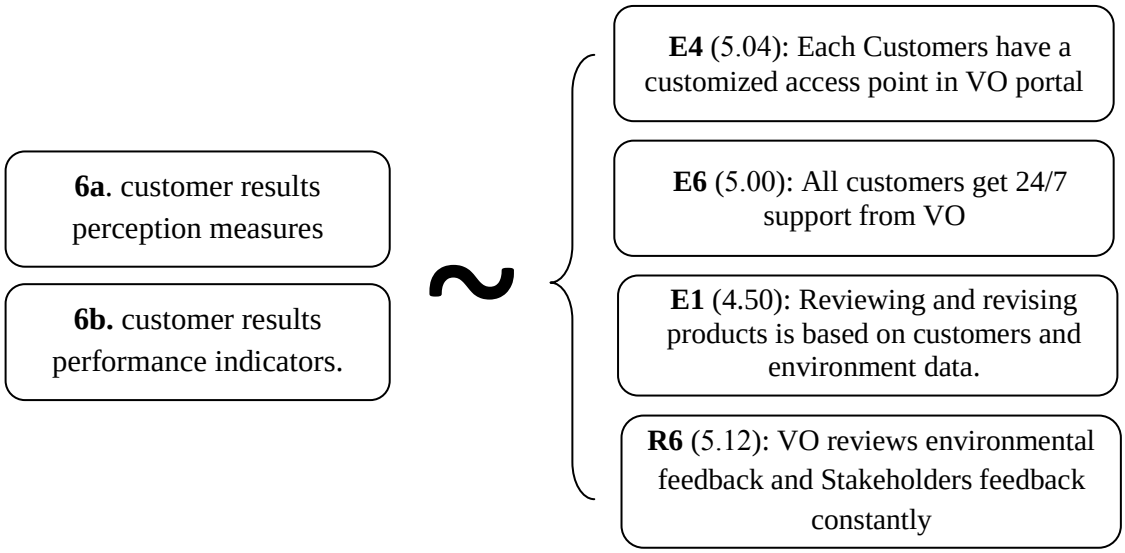


Figure 81: EFQM and VOEM equation for 6a, 6b sub-criteria

EFQM also emphasized on the People's Results as "Excellent organizations comprehensively measure and achieve outstanding results with respect to their people. This is one of the most important aspect of the result an organization must be conscious about it. Based on Extensive Literature review, field experiment and interviews we also find that Virtual organization team (people) is one of the most important aspects of productivity.

According to Literature review Virtual organization achieves its goal trough geographically outspread teams and reviewing their satisfaction and performance is one of the most important task of a VO. But according to the fact that face to face interaction in the same physical place is quite rare in VO so there must be a process to set the indicators of teams' satisfaction and performance and review their results closely to conduct any change in the process of Virtual organization. After a discussion in the expert meeting, team decided to include Teams results statements in the "Results" factor. These statements are as below and the equation for this section would be 7a + 7b ~ R3 + R7 + R9.

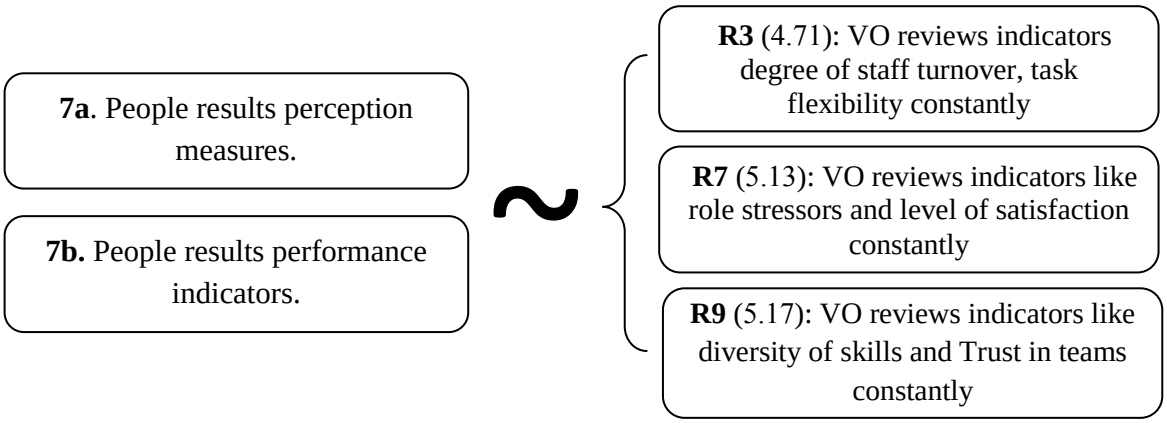


Figure 82: EFQM and VOEM equation for 7a, 7b sub-criteria

Based on extensive Litreture review we found small evidence of the social responsibility of Virtual organizations so in this factor there is slightly difference between EFQM and VOEM. In EFQM these measures are of the society's perception of the organisation (obtained, for example,from surveys, reports, press articles, public meetings, public representatives,

governmental authorities). Some of the measures contained in the guidance for Perception Measures may be applicable to Performance Indicators and vice versa.

Altough there are not many clear evidance in the Litreture review with the Social responsibility key words but these points are mostly covered by other factors or sub-criteria. For example responsiveness to contacts as an employee or employer is one of the images of social responsibility that is cobered in customers support sub-criteria in Environment factor. Other exampels are disclosures of information relevant to the community; impact on local regional, national andglobal economies; ethical behaviour and voluntary work and philanthropy that is also relevant for Virtual orgaization.

Despite the fact that we did not find most of these statements in letreture review of virtual organization but this kind of new for or organizing work is mainly created to solve these kind of problems. Altough in VOEM there is not a mutual factor to this criteria but in most of these cases virtual organization feels responsibe for these values.

9th factor in EFQM model is Key performance results which divided into 2 sub-criteria of outcomes and indicators . The first part measures are key results defined by the organisation and agreed in their policy and strategies and the second sort of measures are the operational ones used in order to monitor and understand the processes and predict and improve the organisation's likely key performance outcomes.

Based on Litreture review some of these financial outcomes may include market related and general data (sales,nshare price, dividends etc); Profitability (gross margins, earnings per share, earnings before interest and tax, contribution margin etc); Return on invested capital, Return on net assets; and some of the non financial one may include Market share ;Time to market; Success rates ;Volumes ;Process performance.

And among the Key Performance Indicators in the virtual organization litreture review was included Cash flow, Maintenance costs,Project costs, Processes (performance; assessments; innovations; cycle times) ,External resources including partnerships supplier performance: supplier price; number and value added of partnerships, Technology (innovation rate; value of intellectual property; patents; royalties); Information and knowledge: (accessibility; integrity; value of intellectual capital).

Based on these evidance in the litreture in the experts meeting we came up with the of statements for the Results factors . Figure below shows this equition

In short , the most important fact about this factor is that, 4 Results factor in EFQM have been replced with 1 main criteria in VOEM. while EFQM have 4 result factor called , Customer Results, People Results, Society Results and Key Performance Results, in VOEM we only have a "RESULT" criteria but we have covered all the 4 diffferent aspects in the statements of this factor.

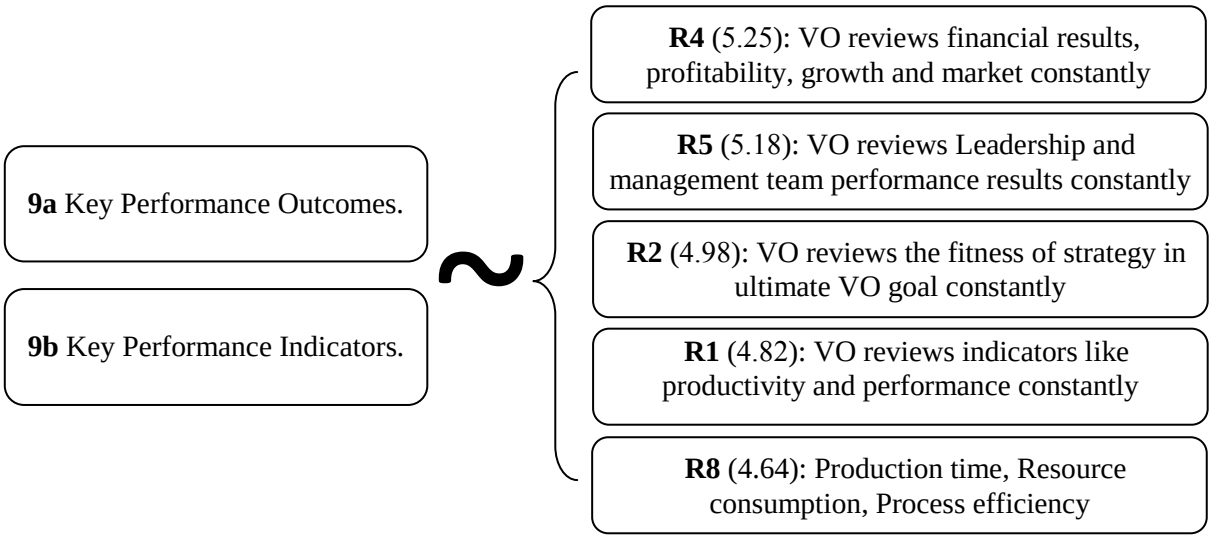


Figure 83: EFQM and VOEM equation for 9a, 9b sub-criteria

4.3.4. Factors Ranking

One of the interesting results of survey analysis was when we saw meaningful ranking between elements of VOEM. Although EFQM never ranked main factors and naming them by number was not based on any order but it was interesting for us to see among these main factor which one was the most important and which one had less effect in the mind of Virtual organization and EFQM experts.

To Rank the Importance of factors and their contribution in business excellence, in the first step respondents of the survey were asked to rate the importance of each factor in last part of the questionnaire (1). In the second step we analyzed the result with Anova Friedman test in SPSS 16.0 and found a new order (2). These two results are illustrated in two Tables below. These results were computed on an Excel spreadsheet using its embedded functions.

1 *Factor*	*Rank#*
Leadership	1
Knowledge	2
Environment (Customers, Suppliers, competitors …)	3
Teams	4
ICT framework	5
Process	6

2 *Var*	*Mean Rank*
Teams	4.51
Leadership	4.36
ICT	4.29
Results	4.10
Process	3.87
Knowledge	3.62
Environment	3.25

Result of this test showed that there is a slightly difference between result of factor ranking in questionnaire and the result of Anova Friedman test. This is interesting to see that when we asked experts to rank the enablers on average they gave Leadership the highest importance

and while we asked them to answer to the questions they unconsciously gave the teams statements the highest position .

Other interesting difference is in the Knowledge criteria. While this factor is one of the most important one in the ranking question, in the results analysis it is among the least important one. This might be because in the analysis other factors got more score and moved to the top of the list like ICT framework.

In this case maybe instead of focusing on small differences that would be better to focus on the whole picture. The reason of this difference might have some social and psychological cause and this analysis is beyond the target and literature analysis this study .Future researches can focus on this matter and dig deeper into the socio psychological cause of this difference.

4.3.5. Analyzing the possibility of any relation between demographic aspects and main factors

As mentioned in chapter 3 we found 3 meaningful relations between means of different demographic factors and main Excellence factors. Also as we dissuaded in the chapter 3 we conducted the same test on all the other demographic characteristic of the sample but there was not any other meaningful results other than these 3 so here we will focus on these 3 and analysis.

Leadership and Gender:

Leadership importance differed significantly among the responses in two gender groups. As it is shown in the figure below, male experts gave more importance to leadership factor in excellence model (M = 8.47) and less importance have been given to leadership in excellence model (M = 8.02) by females.

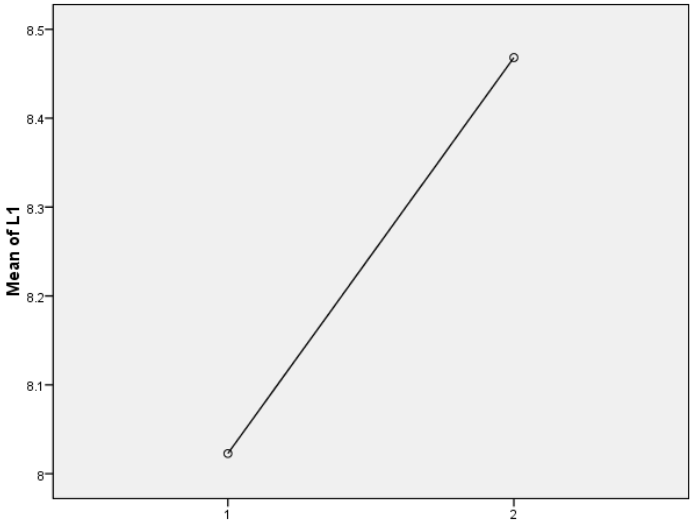


Figure 84: Leadership and Gender relation

Interpret this results is so importance because there are many researches pointing at the perception of people of male and female leaders but in this case we had male and female

experts who rates 9 statements about the importance of the Leadership in Virtual organization. Results show that on average men gave leadership statements more score than women. This maybe can be interpreted as the perception of leadership in the mind of men and women.

In the Literature review we did not came across such result in articles in EFQM or Virtual organization area so we focused our research in the leadership psychology area. Paustian-Underdahl SC, Slattery Walker L, Woehr DJ (2014) in form of a meta-analysis addresses this debate by quantitatively summarizing gender differences in perceptions of leadership effectiveness across 99 independent samples from 95 studies.

Results show that when all leadership contexts are considered, men and women do not differ in perceived leadership effectiveness. Yet, when other-ratings only are examined, women are rated as significantly more effective than men. In contrast, when self-ratings only are examined, men rate themselves as significantly more effective than women rate themselves.

So despite the fact that we saw a significant different between men and women in the importance that they gave to Leadership it chive productivity and excellence , we could not found any other research backing this hypothesis and this needs be focused by another researcher as it is a very interesting area.

ICT framework and gender:

ICT framework's importance differed significantly among the responses in two gender groups. As it is shown in the figure below, male experts gave more importance to ICT framework's factor in excellence model (M = 8.50) and less importance have been given to leadership in excellence model (M = 8.14) by females.

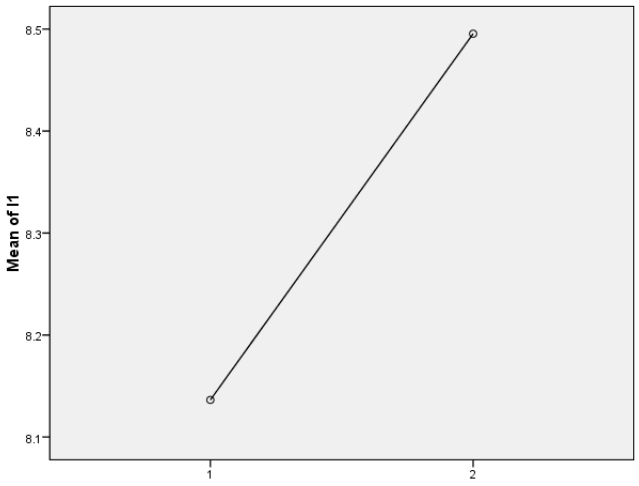


Figure 85: ICT framework and gender relation

Analysis of this difference is as important as this is not the difference between men and women ability and skill in ICT; this is only these 2 gender's perception of the importance of ICT framework in the productivity and excellence of Virtual organization. Although there is not exactly the same study to compare results with but as mentioned in the demographic

characteristic of the research sample there are differences between male and female in ICT area.

The difference between men and women perception of importance of ICT framework in VO excellence might be because of psychological issues. Dismissive explanations such as "women just aren't interested in computers" or "women aren't as smart as men" implicitly reinforce the stereotypical mentality that women are genetically predetermined from conception to not be interested in computers. Even if women are able to acquire better education and training and begin to enter ICT fields in greater numbers, women's leverage within the ICT job market may be undercut by the feminization of certain ICT occupations whereby "large numbers of women enter a profession and as a result, there is a drop in salaries, status and working conditions" (Hersh, 2000).

Feminization has plagued other sectors, perhaps with the exception of law and medicine, and Hersh raises the question of how engineering and ICT professions can be opened up to women and "become a genuinely gender neutral profession without a resulting drop in salaries and status" (Hersh, 2000).

The perception of women being passive consumers of ICT rather than producers extends to their work related use as well, where one continues to see a feminization of lower level ICT jobs and women in a more reactive role of receivers of ICT-type jobs. The lower skilled ICT jobs that women typically find themselves in are word-processing and data entry. Trends and dynamics of global job distribution have also seen women taking up more social-related ICT jobs such as working in particular divisions of the call centers industries, information-processing, banking, insurance, finance, printing and publishing, where skilled requirements are relatively lower than in software development. The entry of women in the new technology service sector is not only recent, but there are fewer jobs numerically compared to those that had been created in manufacturing.

Women tend to represent a very small percentage of managerial maintenance, software developers, or design personnel in operating systems and networks. Evidence also indicates that women are conspicuously absent from decision-making structures in ICT in developing countries. These structures include boards and senior management of private IT companies, senior management and advisors of international policy and regulatory organizations, technical standards-setting organizations and industry, and professional organizations.

Despite the appalling statistical scenario of women and ICT use, and its 'easy-to-miss' implications on women's employability, women have taken on leadership roles in technology, debunking the 'women just aren't' argument, of women not being technically inclined. It is important that this information is shared with a wider audience of women and girls to help reverse the mentality and attitude women generally have towards technology as a result of years of socialization that says 'technology is a male domain'.

As Swasti Mitter expressed in her keynote address at the Global Knowledge II Women's Forum in Kuala Lumpur, Malaysia in 2000, "it is not only in the production of content, but

also in the sphere of production of technology that women's presence is necessary for an efficient and equitable knowledge society…The prospect of addressing women-specific questions in the configuration of software remains remote unless women themselves become visible in the community" (Mitter, 2001).

Although these studies were not exactly in the same subject but could light up to area of women in ICT and maybe this is the reason why they gave the ICT framework less importance than male experts. As could not find the supporting research that would be interesting to conduct more research in this area in the future.

Leadership and position in company:

Leadership's importance differed significantly among the responses in 4 Position group (Leader, Manager or Director, Project manager, Team member). As it is shown in the figure below, Team members gave more importance to Leadership importance in productivity and excellence of Virtual organization (M = 8.91). Less importance have been given to leadership in excellence model (M = 7.76) by Project managers females.

As in this case we had more than 2 groups to ensure the meaningfulness of the comparison we conducted the post hoc tests indicated that out of 4 Position group (Leader, Manager or Director, Project manager, Team member), team members differed significantly from other position and mostly from Project managers. ($P < 0.05$).

Tukey HSD			
Position	N	Subset for alpha = 0.05	
		1	2
3	34	7.76	
2	125	8.17	8.17
1	159	8.39	8.39
4	34		8.91
Sig.		.166	.048
Means for groups in homogeneous subsets are displayed.			

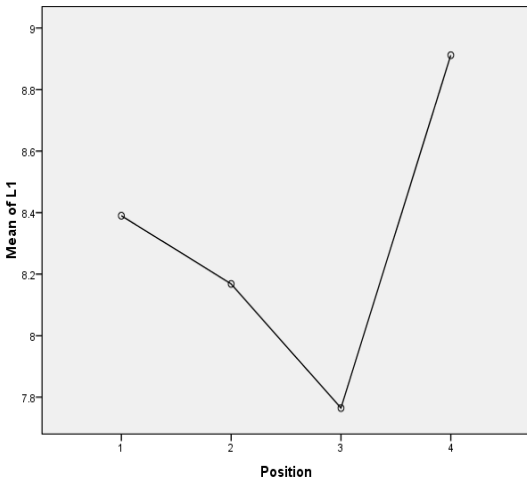


Table 110: Leadership and position in company relation

This case was also one of the issues that we could not many research in this area the closest one was Chin-Yi Chen and Chun-I Li's 2013 research entitle: Assessing the spiritual leadership effectiveness: The contribution of follower's self-concept and preliminary tests for moderation of culture and managerial position.

This research examines several determinants considered to influence the spiritual leadership (SL) effectiveness, including one motivational mediating factor of follower's self-concepts, and two conditional factors, i.e., culture (as a macro-level factor) and managerial position (as a micro-level factor). They integrated the follower's transcendental self-concepts into the

existing SL framework, and validated their substantiality to leadership effectiveness. Their results showed that culture differs on the SL effectiveness, while position hierarchy (managerial vs. non-managerial positions) does not moderate between the intrinsic motivations of SL and in-role/extra-role performance. Chen C-Y, Li C-L (2013).

Although this research was not exactly in the same domain as our study but was somehow in the same subject. As we could not get enough supporting research, we suggest that in the future research this area must be covered.

4.3.6. Relation between main factors

Although we had EFQM as the main framework for developing our model there wasn't enough research aiming the concept of relations between elements. But in our research with the survey results we seeks to fill this gap in the literature by testing the criteria relationships

Based on chapter 3 and analysis of survey results in SPSS 16.0 and IBM AMOS 22.0 we came up with a map of relations between Sub- criteria factors and elements of the model. To consider all the possible relation in the model we draw all the double side relations between main factors of the model. As it has been shown in the figure below there is positive correlation between all the variables which is a proof of this studies seven hypothesis.

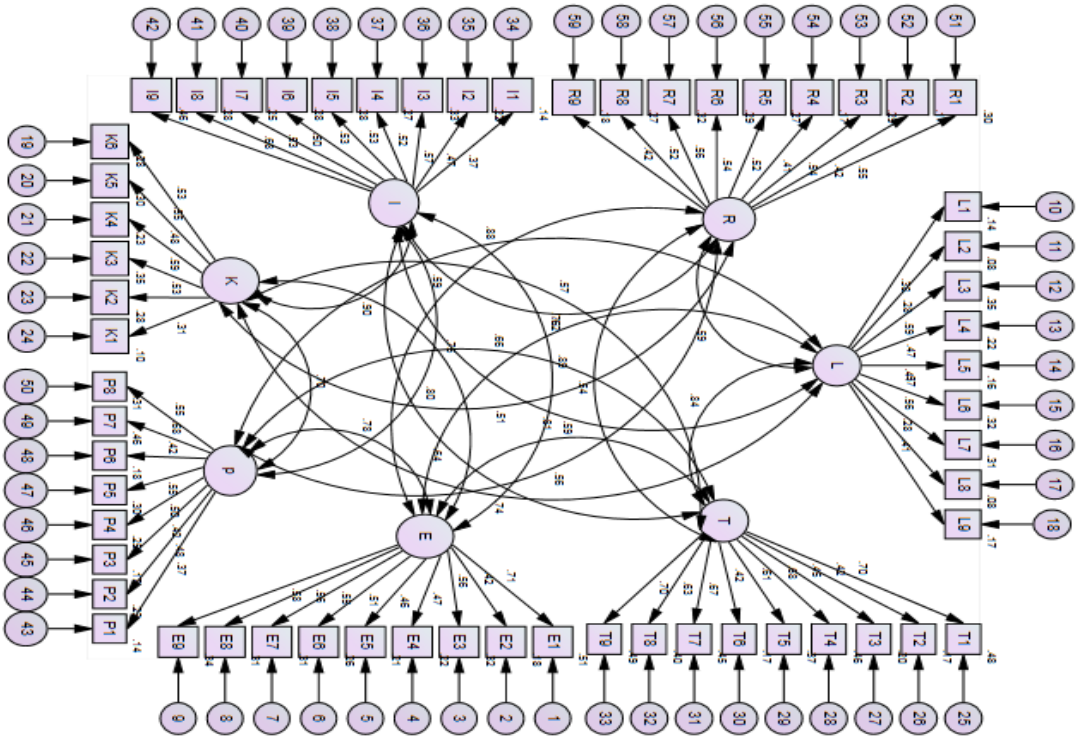


Figure 86 : Conceptual model in IBM AMOS with correlations

Besides, based on Literature review any organizations should take into account the inter relationship between main factors as a proof of the Innovation and feedback arrow in the model. Ultimately, all of the main factors plays significant role in productivity and excellence

of an organizations. As the big picture it means that all the relationships in the model provide an excellent service or product to its customers, service users or stakeholders.

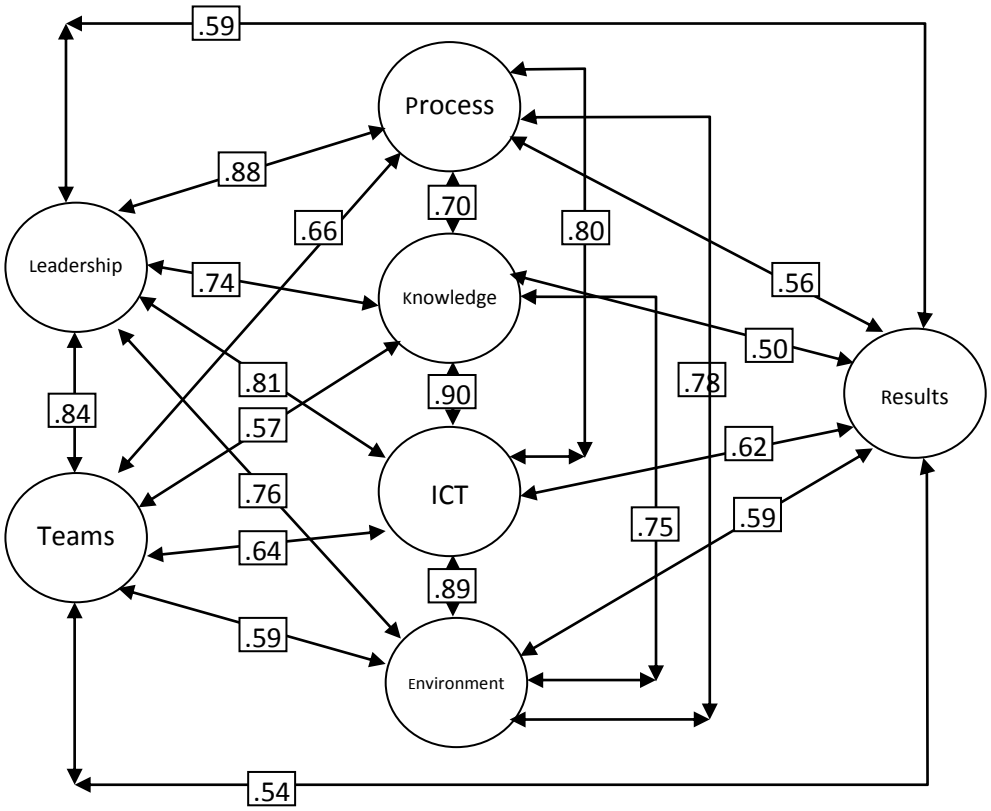


Figure 87 : Correlations weights in the proposed model (0)

The figure above indicates the multidimensional nature of VOEM. These correlations between the VO Excellence Model's constructs indicate that the different activities and outcomes are not independent. This was expected as we also discussed in the chapter 1 Eskildsen and Dahlgaard (2000) illustrate the relationships between EFQM's Enabler criteria and Results within a European service firm (Eskildsen, Dahlgaard, 2000; Calvo-Mora et al. 2005). This model is the way that we expected form literature analysis so it is reasonable to expect a connection between results achieved and actions to improve performance in the Enablers criteria.

But this model could not be useful for an organization as a roadmap because it is too complicated. In other hand existing relation between all the factors of the model may reduce the importance of all of them. This is not a good result for our analysis so as we mentioned in the chapter 3 we continued conducting more analysis to create a more clear vision of this model.

In this study we will extract 2 sub-relational models based on strongest relations and model fit relations. In the strongest relation model we ranked the weight of relations in the model and decided to ignore the one which was less than 0.6 because it would give the model a shape and by increasing the level to 0.7 we could have lost more of the relations so we decided to remain on the relations which was more than 0.6.

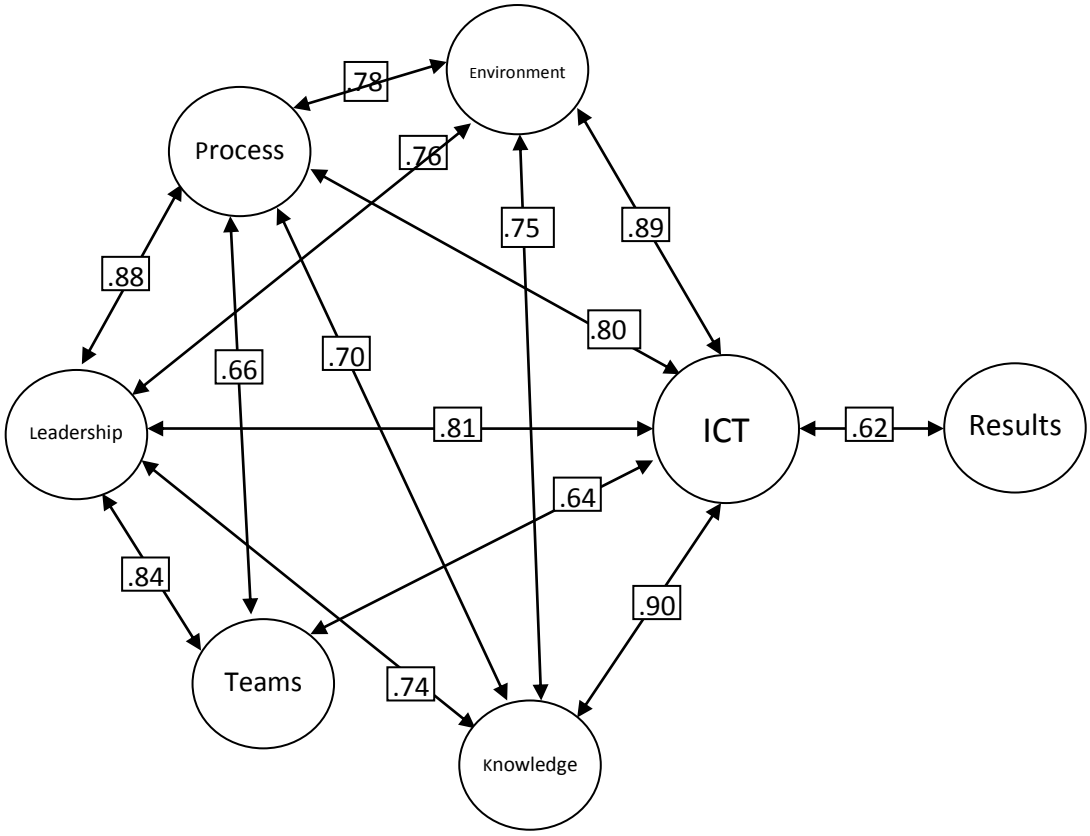


Figure 88 : strongest relations models (I)

One of the most important conclusions that this model shows us is the 1 relation that exists for Results. In other hand this model suggested that "Enabler's" can affect the "Results" of a Virtual organization trough "ICT". We expected this emphasize on the role of ICT, but the main challenge is when we want to see if there is any other research indicating this theory.

Eskildsen and Dahlgaard (2000) in a study, confirm that Process Management is the only Enabler shown to have a direct impact on performance variables. Although theses 2 results are not quite the same but considering the fact that all the process in a Virtual Organization exists on ICT framework could give us a perspective of how we can admit this result.

One of the most unexpected results of this model is the lack of a strong relation between Knowledge and teams. While according to extensive literature analysis and interviews there was a strong belief that team members are the main group in a Virtual organization ho would create and use the knowledge inside the ICT framework. As we only showed the relations stronger than 0.6, maybe this was the main cause of this problem.

Other important point in this model was to see the strongest relation here which was between ICT and Knowledge criteria. Based on the fact that EFQM model does not include any of these 2 factors, so there is not much expectation to find other researches backing this result.

In the second model which is Model fit relations, as we also captured in chapter 3 based on the relations in the model we tested each factor to find relations with others. In this process SPSS 16.0 found many of the relations not being in the significant area of (<0.05) so we omitted them and added a path analysis quality to come with the more rational model in terms of relations between factors. Figure below was our main finding in this process.

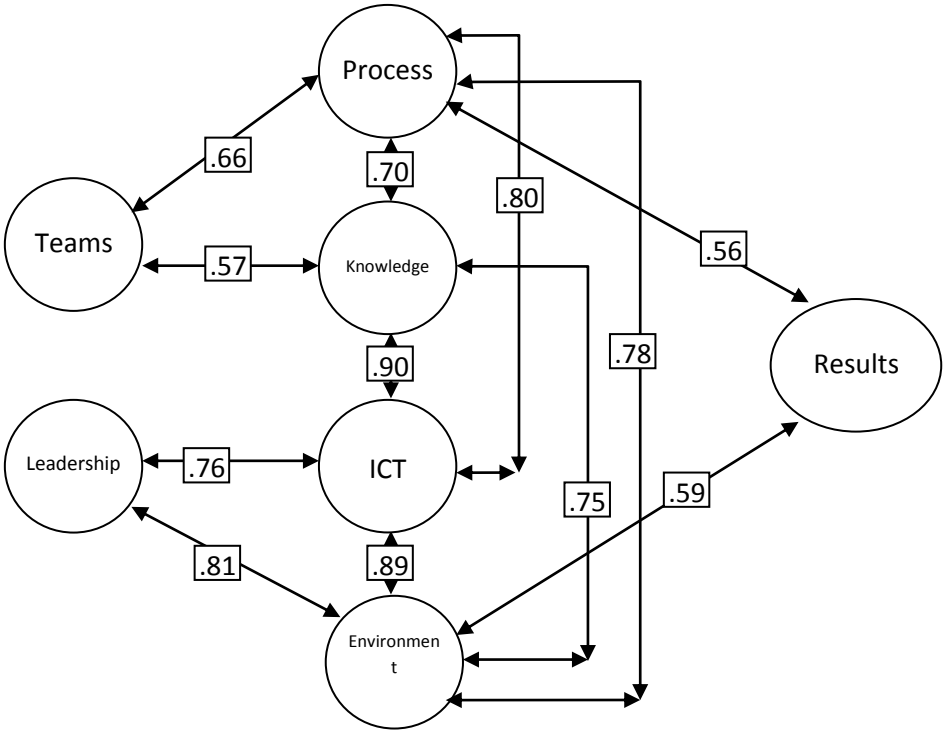


Figure 89: Relationship fit for VO excellence conceptual model (II)

To this point Virtual Organization Excellence Model provided fundamentals of framework for self and assessor's assessment. The full power of the Model is derived from an empirical evidence of the relationships between the criteria in the model. So for example, if a process is highlighted in an enabler criterion, then the outcome of this process might reasonably be expected to appear the Results sections of the application.

As we discussed in the chapter 1 researchers like Bou-Llusar et al. in 2009 grouped Enablers into "social" and "technical" and measure their impact on the Results. They conclude that the social agents have a stronger effect on results than the technical ones. Based on the last 2 VOEM models that indicated 2 different approaches to look at the correlations, we also came down to this conclusion as even the average of Leadership, teams, environment and Knowledge are still higher than ICT and process.

There is another perspective that we could analyze the results from that side and that is to focus on correlations inside enablers and results. One of the differences of the VOEM with EFQM is that, VOEM has only 1 factor results so there is less than 2 factors so correlation could not be measured here. But this is one of the most interesting approaches to analyze enablers.

Based on literature review in chapter 1, there are some researches that investigate any possible relations between EFQM criteria inside enables and results and together. (Eskildsen & Dahlgaard, 2000; Calvo- Mora et al., 2006; Martínez-Lorente et al., 2009; Sadeh & Arumugam, 2010; Gómez-Gómez et al., 2011). There are many relationships that we could not find the mutual one in VOEM , for example based on literature review scholars found relations between Leadership and results , but in VOEM there is not such a strong relation between these two elements because as we discussed before in virtual organizations all the Enabler's effects would reach to Results via ICT framework.

On the other hand there are some of the relations that could not be compared to VOEM as there is not the mutual factor in the new excellence model. For example in literature review of EFQM there was researches that admitted a correlation between Strategy and Key Results but as in VOEM we don't have strategy as a main factor we could not compare this correlation with this new model.

The last group of correlations is the ones who exist in both models (EFQM and VOEM) and we could compare them. For example the correlation of Leadership and Processes has been admitted by scholar. This correlation was seen in the Model (I) of correlations between VOEM factors. This correlation happened when leadership affects the productivity of a firm trough designing process of work. This correlation is same to the correlation of V-leadership with the virtual process. Same situation is applicable to the correlation between Processes and Results (Key). We have seen this correlation between these 2 factors in the Model (II) of correlations.

As we also saw in the model (0) of correlation there is different kind of correlation between al the enabler's criteria. In the literature review of EFQM in chapter 1 we discussed that Eskildsen et al. (2000) has shown that the enabler criteria are linked together in a very complex structure, making it very difficult to discern between them.

According to this interpretation of the enabler side of the EFQM Excellence Model, changes in one dimension are related to changes in other dimensions, and there is therefore a reciprocal interdependence between all enabler components which according to VOEM is the same for virtual organizations.

In short this is still a recent line of investigation correlations between elements of model and there is a strong need for more empirical support from different settings. These correlations will enable better understanding of VOEM and EFQM.

4.4. Criteria scoring for VOEM in comparison with EFQM 2013

Based on the scoring system of the EFQM Excellence Model and analysis of Survey result we got the weight of Virtual organization Excellence Model as table below.

	Variable	Score coefficients (R Square)	Factor weight in the model	Weight percentage
1	Environment	0.113	135.9807461	14
2	ICT	0.161	193.7424789	19
3	Leadership	0.079	95.06618532	10
4	Process	0.151	181.7087846	18
5	Result	0.08	96.26955475	10
6	Team	0.096	115.5234657	12
7	Knowledge	0.151	181.7087846	18
Total		0.831	1000	100

Table 111: VOEM criteria scoring

To make self-assessment and award assessment possible, Virtual companies need to use the scoring process described to allocate points and to arrive at a total score out of 1000 points. Following figure demonstrates these weights of the factors in the model. This is more useful way to create clear vision and make possible to compare the final model with the EFQM 2013.

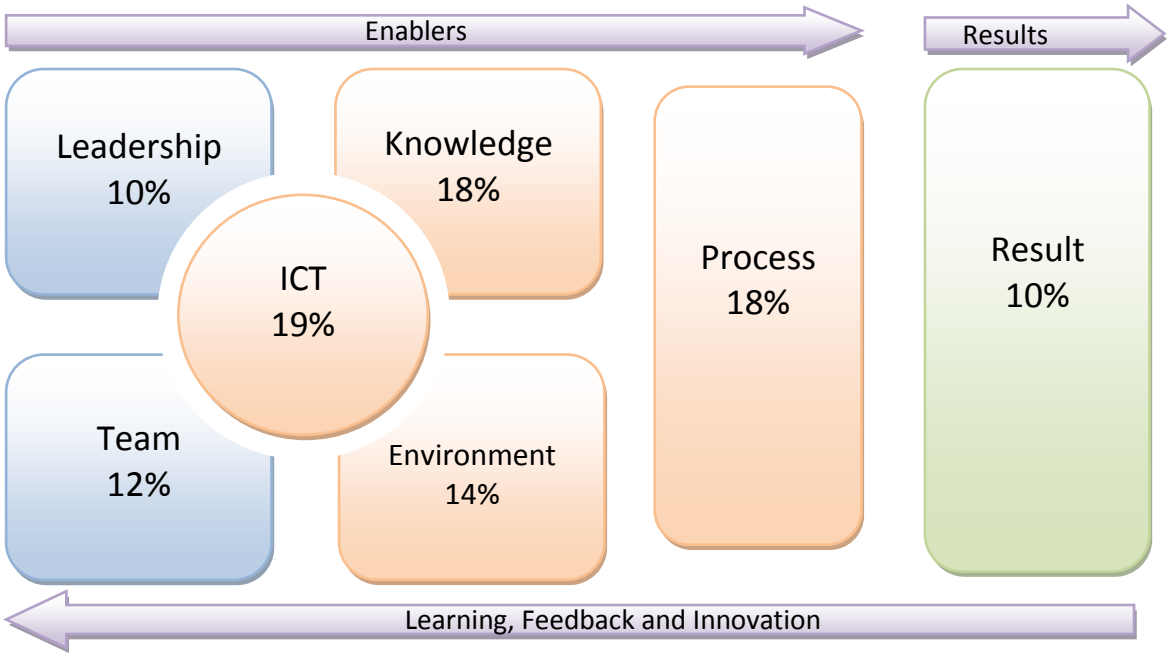


Figure 90 : VO Excellence Model

Now that we have VOEM criteria weight as we mentioned in the chapter 1, which would be useful to see factor's weights of EFQM 2013 model again.

Figure 91 : EFQM 2013 model including criteria weights

The first thing that seems necessary is to compare the weights between 2 models, but because there is not a common ground between these two model this isn't seems logical to compare them . Comparing factor's weight seems not useful because their sub-criteria's are quite different as we discusses in the Hypothesis section in this chapter.

In the other hand while a factor like Leadership have exactly the same percentage weight of the whole model, we could not conduct ant deduction and have a conclusion. There is two reasons for that, one is because the total number of criteria's in 2 models is not the same while EFQM has 9 criteria, VOEM has only 7. The second reason would be Leadership in EFQM model implicates 5 sub-criteria so much different from 9 sub-criteria of VOEM model.

But as we mentioned in literature review of total quality management models, assigning scores of factors in the model points is not just for clarifying the importance of them. This is more because assessors use this scores and RADAR Scoring Matrix to allocate points to each of the elements in the Model. This matrix is based on the RADAR logic which lies at the heart of the EFQM Excellence Model. As we developed the Virtual Organization excellence model in the same framework we need to come up with weights and RADAR scoring matrix for VOEM.

Tables below shows RADAR scoring matrix adapted for Virtual organization excellence model to help assessors have all the tools to asses Virtual firms. We will demonstrate these matrixes and add explanations to make it much clear in this study. First RADAR Scoring Matrix - Enablers:

ELEMENTS	ATTRIBUTES	0%	25%	50%	75%	100%
APPROACH	**Sound** - approach has a clear rationale - approach has defined processes - approach focuses on stakeholder needs	No evidence or anecdotal	Some evidence	Evidence	Clear Evidence	Comprehensive evidence
	Integrated - approach supports policy and strategy - approach is linked to other approaches as appropriate	No evidence or anecdotal	Some evidence	Evidence	Clear Evidence	Comprehensive evidence
	Total	0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100

ELEMENTS	ATTRIBUTES	0%	25%	50%	75%	100%
DEPLOYMENT	**Implemented** - approach is implemented	No evidence implementation	Implemented in 1/4 of relevant areas	Implemented in 1/2 of relevant areas	Implemented in 3/4 of relevant areas	Implemented in all relevant areas
	Systematic - approach is deployed in a structured way with the method used for deployment - being planned and executed soundly	No evidence or anecdotal	Some evidence	Evidence	Clear Evidence	Comprehensive evidence
	Total	0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100

ELEMENTS	ATTRIBUTES	0%	25%	50%	75%	100%
ASSESSMENT & REVIEW	**Measurement** - regular measurement of the effectiveness of the approach and deployment is carried out	No evidence or anecdotal	Some evidence	Evidence	Clear Evidence	Comprehensive evidence
	Learning is used to: - identify best practice and improvement opportunities	No evidence or anecdotal	Some evidence	Evidence	Clear Evidence	Comprehensive evidence
	Improvement - Output from measurement and learning is analyzed and used to: - identify, priorities, plan and implement, improvements	No evidence or anecdotal	Some evidence	Evidence	Clear Evidence	Comprehensive evidence
	Total	0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100
	Overall Total	0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100

Table 112: RADAR Scoring Matrix - Enablers

Each of the 6 enabler's sub-criterion elements in VOEM is evaluated according to 3 perspectives of Approach, Deployment and Assessment and Review. The score given for Approach will take account of:

- ✓ The soundness of the method or process being described by VO members - the extent to which it has a clear target and is focused on overall strategy of VO;

- ✓ The extent to which the method or process being described is integrated - supports VO policy and strategy, is linked to other approaches where appropriate and is part of business as usual (fully integrated into every day activities).

The score given for Deployment will take account of:

- ✓ The extent to which the approach has been implemented across different areas and layers of the virtual organization;
- ✓ The extent to which deployment of the approach is systematic fitting the ICT framework.

The score given for Assessment and Review will take account of:

- ✓ The measurements and sensors are recorded;
- ✓ The learning activities;
- ✓ The improvements that have been identified prioritized, planned and implemented.

With the help of these tables the Assessors will be able to allocate separately a percentage score for approach, deployment and assessment and review. An overall percentage score is then derived for each sub-criterion element. Following tables demonstrates the RADAR scoring matrix for Results criteria:

ELEMENTS	ATTRIBUTES	0%	25%	50%	75%	100%
RESULTS	**Trends** - trends are positive AND/OR - there is sustained good performance	No Results or anecdotal information	Positive trends and/or satisfactory performance for about 1/4 of results over at least 3 years	Positive trends and/or sustained good performance for about 1/2 of results over at least 3 years	Positive trends and/or sustained good performance for about 3/4 of results over at least 3 years	Positive trends and/or sustained good performance for all results over at least 3 years
	Targets - targets are achieved - targets are appropriate	No Results or anecdotal information	Achieved and appropriate for about 1/4 of results	Achieved and appropriate for about 1/2 of results	Achieved and appropriate for about 3/4 of results	Achieved and appropriate for all results
	Comparisons - results compare well with others AND/OR - results compare well with acknowledged 'World Class'	No Results or anecdotal information	Favorable comparisons for about 1/4 results	Favorable comparisons for about 1/2 results	Favorable comparisons for about 3/4 results	Favorable comparisons for all results
	Causes - results are caused by approach	No Results or anecdotal information	Cause and effect visible for about 1/4 results	Cause and effect visible for about 1/2 results	Cause and effect visible for about 3/4 results	Cause and effect visible for all results
	Scope - results address relevant areas - results are appropriately segmented e.g. by customer, by business	No Results or anecdotal information	Results address 1/4 of relevant areas and activities	Results address 1/2 of relevant areas and activities	Results address 3/4 of relevant areas and activities	Results address all of relevant areas and activities
	Total	0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100
	Overall Total	0 5 10	15 20 25 30 35	40 45 50 55 60	65 70 75 80 85	90 95 100

Table 113: RADAR scoring matrix for Results

Each of the 9 Results sub-criterion elements in VOEM are evaluated according to the excellence and scope of the results presented. The excellence of virtual organization's results takes account of:

- ✓ Positive trends and/or sustained good performance;
- ✓ Comparisons with own targets;
- ✓ Comparisons with Environment including as appropriate competitors, industry averages and 'best in class' organizations;
- ✓ The extent to which the results presented are caused by the approaches described in the Enabler criteria.

The scope of results takes account of:

- ✓ The extent to which the results cover all relevant areas of the Virtual organization;
- ✓ The extent to which a full range of results relevant to the sub-criterion elements is presented;
- ✓ The extent to which the relevance of the results presented is understood.

With the help of these tables the Assessors will be able to allocate separately a percentage score for Results. An overall percentage score is then derived for each sub-criterion element. The final step would be to summarize all the percentage that each sub-criterion in the VOEM gained in a table to create a general picture.

Criterion Number	L	%	T	%	I	%	K	%	E	%	P	%	R	%
Criterion Part	L1		T1		I1		K1		E1		P1		R1	
	L2		T2		I2		K2		E2		P2		R2	
	L3		T3		I3		K3		E3		P3		R3	
	L4		T4		I4		K4		E4		P4		R4	
	L5		T5		I5		K5		E5		P5		R5	
	L6		T6		I6		K6		E6		P6		R6	
	L7		T7		I7		.	.	E7		P7		R7	
	L8		T8		I8		.	.	E8		P8		R8	
	L9		T9		I9		.	.	E9		.	.	R9	
Sum of parts	.		.		.		.		.		.		.	
		÷ 9		÷ 9		÷ 9		÷ 6		÷ 9		÷ 8		÷ 9
Score awarded														

Table 114: Scoring Summary Sheet

Up to this step everything is in percentage scale but to compare virtual organizations and create a clear image of how they did it is necessary to their Point awarded in the VOEM

model. First assessors must enter the score awarded to each criterion (of both Enabler and results sections then multiply each score by the appropriate factor to give points awarded and finally add points awarded to each criterion to give total points awarded for application. Table below demonstrates the method of calculation of the final point:

Criterion	Score Awarded	factor scores	Point awarded
Leadership		× 0.1	
Teams		×0.12	
ICT		×0.19	
Knowledge		×0.18	
Environment		×0.14	
Process		×0.18	
Results		×0.1	
Total points awarded:			

Table 115: Calculation of Total Points

This table was the last component of an assessing framework for Virtual organization excellence model. Tables we presented in this section helps VO's and VO assessors to assess firm's position in the process of moving toward excellence.

4.5. Summary of chapter 4:

As widely discussed in this thesis, we state that current business excellence model and mostly EFQM 2013 model were suitable mainly for traditional organizations due to the specific characteristics of Virtual enterprises. We have responded to this limitation with presenting the VOEM. We consider that the proposed virtual organization excellence model and the data obtained due to its empirical application have provided valuable information for decision-makers not only in EFQM organization, but also in the world of TQM models and awards based on it.

In this chapter beside the VOEM we developed other concepts to have a complete excellence model for Virtual organization which could be use in world's most famous excellence awards. For example regarding the "Fundamental Concepts of Excellence model" we outlined the essential foundation for achieving sustainable excellence for any virtual organization which was very similar to the EFQM. The importance of these fundamental concepts is high because they could help a VO to create a united culture and have a common language inside of the VO.

We also analyzed the characteristic of this study's sample and compared it with other available studies which were in almost same area. For example among 352 respondents, 132 (37%) were female and 220 (63%) were male was expected because other researches were in

quite same situation and this characteristic was influenced by the bigger gender gap in technology field in the world.

Then we analyzed each Hypothesis and the Literature background. In each main factor (Hypothesis) we also analyzed the difference between VOEM and EFQM and the way that this part of survey can shape a certain percentage of study's Model. In this section we discussed about how each sub-criteria in EFQM have been presented by one or more sub-factors in VOEM and the literature analysis would cover all the details regarding the main factors and sub-criteria in VOEM and also the reason of not existing some EFQM factors in VOEM and the newness of some factors in VOEM.

For example we can mention "Strategy" factor in EFQM which is not part of the VOEM's main factors. In this case in extensive literature review, field experiment, interviews and expert meeting we came to this conclusion that strategy design is mainly part of leadership's roles in virtual organization so to make it more simple VOEM we decided not to be among the main factors.

Other example would be "ICT framework" which does not exist in EFQM and we have it as one of the most important part of VOEM. In this case it come down to the main characteristic of a virtual organization which is existing on a ICT platform on the net, So this is quite normal why this factor does not exist in EFQM as this model designed for traditional organization and we found it in our research process of virtual organization

Then we found 3 meaningful relations between means of different demographic factors and main Excellence factors. For example in the case of "relation between importance of leadership for different Gender", we found that male experts gave more importance to leadership factor in excellence model (M=8.47) that females (M=8.02). Although in EFQM researches we did not find a clear research to back this, but Paustian-Underdahl et al. in their article in 2014, showed that when self-ratings are examined, men rate themselves significantly more effective than women rate themselves.

At last part of this chapter Based on the scoring system of the EFQM Excellence Model and analysis of Survey result we finalized the weight of Virtual organization Excellence Model to make self-assessment and award assessment possible. Finally based on these scores we developed the RADAR Scoring Matrix for Enablers, Results and whole model.

Finally, as mentioned in this chapter, even though we have developed a virtual organization excellence model and tried to create all the different aspects of VOEM framework, there is still room for its improvement into an even more reliable and valid model and tool. As a consequence, a further research agenda, aiming to continue the line set out by this thesis, should concentrate on refining the scale and its theoretical constructs, especially if any specification to sectors is intended.

5. Chapter five: Conclusion

5.1. Introduction

The rapidly improving reach, accessibility and capability of information and communication technologies (ICTs) has created the possibility of a virtual world in which face-to face interactions are replaced by interactions via technology-mediated-communication. At the same time, organizations have also been increasingly employing team-based organizational structures to improve performance, believing in the value of teamwork to deliver productivity, flexibility and collaboration. The nexus of these two trends is the emergence of the concept of 'virtual organization'.

Virtual work is already a fact of life. By using new technologies, companies are finding ways to get essential tasks done while their people enjoy greater flexibility. According to Business Week "It's not that offices will ever become obsolete, but companies which used to figure that the talent would come to them, more and more, they are going to have to figure out how to get the work to the talent."

In creating virtual workplaces, organizations need to think about more than technology. They cannot ignore the need to get teams off to the right start, address ongoing working relationships, and ensure that their teams achieve and maintain high performance and enjoy an enhanced sense of satisfaction.

Leaders must learn new ways to direct and guide virtual teams and organizations staying focused on people as much as results. To create excellence, virtual organizations need to develop, implement, and integrate technology with human-focused approaches that amplify the power of interactions and create quality experiences for people across time, cultural, and geographic boundaries. Jessica Lipnack says, "Cyberspace is a vast new civilization, containing places of commerce and an already deep social life…. In time, virtual teams will become nothing special, but rather the natural way to work.

Based on what has been mentioned in this thesis the general objective of this PhD study was to develop a business excellence model for Virtual organizations. In this thesis we made a research designed mainly to develop a model for managing VOs toward excellence. In this process we worked with VO, EFQM and Excellence practitioners and this led us to be more practical action oriented rather than a having pure academic results.

Accordingly, the main research objective was to identify the most important factors which affected the Virtual Organization productivity and creating an Excellence model for VOs. While trying to fulfill this objective, in the first chapter we have explored Virtuality and virtual organization literature, quality management theory and business excellence models. Then we chose European foundation for productivity management (EFQM) model as the latest expression of the dominant approach of Excellence which is TQM. In the next step we conducted an extensive literature review on the Virtual organization literature .This process provided interesting theoretical findings. One of them was developing the global virtual organization model in the first chapter.

To create a complete excellence model for virtual organizations we must have first designed a conceptual model with the same culture as EFQM. In this step we designed a model called 300 to accomplish this mission but to have a complete model we needed to determine main factors, sub-criteria and their related weights.

To add more experience and reality content to this process, in field experiment we built a virtual organization called “Tstab” (a start-up that worked completely virtually). With help of online organizational task management software we documented every step of this journey.

Then based on these experiences, interviews and expert meeting we designed a 59 statement questionnaire. We have invited Virtual organization members, EFQM assessors and Business excellence experts to fill the questionnaire. After the process of data collection (and elimination of non-complete responses) we came down to 352 responses ready to get analyzed. Then we analyzed the responses using statistical software and the results reported in chapter three.

In chapter 4 we developed the Virtual organization excellence model (VOEM) and presented the details of it .This model will be a roadmap for Virtual organizations to move toward excellence and for assessor to have a tool to analyze this kind of organizations.

5.2. Important factors to be considered

Based on literature review we could say that in a technology-enabled business environment, virtual organizations are gaining growing acceptance among the business people. They view virtual organizations as the best means to harness the benefits of information technology in the most productive and profitable way. In fact, the benefits of a virtual organization are so overwhelming that it is all set to occupy a place of prominence in the future business scenario. According to the 300 statements in “extensive literature review” we could clearly see the benefits of virtual organizations.

- Absence of distance barrier: The physical distance of members is no longer an important factor in establishing an organization. When everyone can access everyone else wherever they might be, distance cannot be a hurdle.

- Reduction of overhead costs: ICT could help VO to reduce their costs which directly affect the productivity of a virtual organization

- Agility in response: Virtual organizations are able to respond quickly to customer requests and market change and they can save time which is the main factor for agility.

- Savings in physical space Cost: A virtual organization capitalizes on the telecommunications infrastructure to overcome the constraints of space. The cost of space is reduced considerably in this form of organization.

- Possibility to work round-the-clock: Virtual organizations facilitate the distribution of work across time zones and this gives them the ability to work for 24 hours a day.

- Efficiency in managerial process: VO through an improved utilization of the ICT framework for communication, supervision and control, can enhance the efficiency of the managerial team members.

- Being more customer-oriented: VOs have more customer-oriented process than traditional firms because their fundamental values emphasis on enhancing customer satisfaction and getting repeat business.

- Accessing to the world's talent pool: As nowadays people can access to the internet so VO's could hire people from all around the world.

- Reduced work stress and fatigue: Since the time and duration of work are determined by the employees, work-related stress and fatigue can be reduced considerably.

- Maintaining the work–life balance: The work–life balance can be well maintained by the employees in virtual organizations as the time is judiciously shared between work and personal activities like child caring and parent caring.

- Encourage creativity and innovation: Creativity and innovation have a much better chance of thriving when organizations not only build teams by leveraging their entire global talent pool, but also develop talent by exposing individuals to a global range of challenges and perspectives.

- Build a more responsive organization: In the virtual workplace, work is no longer confined to traditional time periods. Employees, who themselves value the flexibility of working virtually, are more willing and able to work or make themselves available outside of office hours. Organizations are better able to respond to fast-changing developments and coordinate work among business units in different time zones.

Beside all these valuable benefits, the main characteristic of this new form of organization creates some limitations too. In the literature review we mentioned some of these limitations and we brought these issues to the interviews and expert meeting to create a solution for them in the VOEM. The main finding of this analysis was that these limitations follow all the systems like telecommuting and cyber links and that is naturally acceptable. Other risks and limitations could be:

- Lack of managerial control risk: as mentioned in the V- leader's criteria of the VOEM, they must be aware of the risk of inability to ensure adequate supervision and managerial control over the activities of the virtual employees, who work away from the management.

- Technology-related challenges: based on ICT factor's sub-criteria in VOEM, VO's must be aware of the challenges using ICT framework or using any kind of technology would cause and be prepared for it.

- Misuse of Electronic Instruments and Consumables of the Organization: There is a scope for dishonest and unscrupulous employees to use the company properties for purposes other than those for which these instruments have been given to them.

- Limited Application: Virtual organizations are not suitable for all types of business operations. As such, they have very limited utilities and are mostly confined to the creation of virtual products and services.

- High Maintenance Cost: In addition to the equipment and installation cost, virtual organizations may have to spend huge sums of money on routine maintenance costs like the one related to network.

- The lack of Involvement and Commitment risk: Since the employees mostly remain away from the office and keep only a formal and irregular contact with their superiors and colleagues, this may cause less value that they feel towards their organizations. Consequently, if their level of involvement and organizational loyalty not be high the organization may eventually suffer form of high labor turnover.

These virtual organizations strength and weakness was one of the results of the process that we conduct to develop a Virtual organization excellence model (VOEM). If we look at the VOEM from different perspective we could say that this model contains the most effective solutions for virtual organizations to overcome their weakness using their strength. Here we will present three of the most important statements in each main criteria of VOEM (Leadership, teams, ICT framework, Knowledge, Environment and Results) that can enhance excellence in the functioning of any virtual organization:

- ✓ 3 of the most important role of virtual leader to positively affect the excellence in virtual organization are
    - Setting VO strategy design, Rules, Vision, Mission, Performance metrics, etc.
    - Relationship and Trust building, conducting one to one communication
    - Having leadership soft skill and Personal skills

- ✓ 3 of the most important characteristic of virtual organization ICT framework to positively affect the excellence in VOs are:
    - Possibility for VO members to communicate to each anywhere and anytime
    - ICT framework includes an administrative dashboard for VO leader and managers
    - ICTF is Cloud based (public or private) to prevent and hazard

- ✓ 3 of the most important role of virtual teams to positively affect the excellence in virtual organization are
    - Having a sense of unity and prevent any Isolation prevent
    - Create a collaboration Culture
    - Existing and developing team working personal skills in members

- ✓ 3 of the most important characteristic of virtual organization's knowledge management to positively affect the excellence in VOs are:
  - Identifying different kind of data and putting into VO framework
  - Create a complete data ecosystem inside and outside of VO
  - Create data mining, use and sharing culture

- ✓ 3 of the most important characteristic of virtual organization's Environment (Stakeholders, customers, supplier, partner, etc.) management to positively affect the excellence in VOs are:
  - VO environmental market and legal issues get analyzed constantly.
  - Developing new products conducted based on environmental market analysis
  - In selecting VO's partners, inner alliance is an essential indicator.

- ✓ 3 of the most important characteristic of virtual organization's process to positively affect the excellence in VOs are:
  - Process in VO is clear and transparent.
  - VO process makes resources and time management possible.
  - Interactions with all the stakeholders are in the best fit.

- ✓ 3 of the most important characteristic of Result management in virtual organization's that positively affect the excellence in VOs are:
  - VO reviews financial results, profitability, growth and market constantly.
  - VO reviews Leadership and management team performance results constantly.
  - VO reviews indicators like diversity of skills and Trust in teams constantly.

Besides the main contribution of this study, in the process of data analysis we found other interesting results which worth paying more attention here and again. One of these results was ranking of the main factors in the VOEM model. Results showed that based on experts opinion the ranking was:

1) Teams
2) Leadership
3) ICT framework
4) Results
5) Process
6) Knowledge
7) Environment

This results interpret the message that experts believed Human Resource (Teams) and Leadership in a virtual organization are the most important factors that have effect on achieving Excellence. This was quite expected because based on extensive literature review section we found comparably much more researches in these two areas compare to others.

According to what we mentioned above, we developed the Virtual organization excellence model based on the much planed research process. We presented this VOEM model in the previous chapter, analyzed each main criteria and did a detailed comparison of the main factors of EFQM and VOEM. Here is a short summery of each factor:

- Leadership in VOEM containing wider roles and functions compare to the same criteria in EFQM. We saw some similarities in the main roles of a leader but for example in the policy and strategy criteria VOEM divided the statements in this sub-criteria between leadership and process factor.

- ICT factor in VOEM is a totally new element compare to EFQM. We expected this difference based on the main characteristic of virtual organizations. In the other hand EFQM is designed to help traditional organization to get closer to excellence and that is quite normal not to emphasize on technology. Although EFQM mentioned about the importance of technology in the firms and dedicated a sub-criteria to this subject but this sub criteria is considering all the technologies that an organization use and not specifically ICT. But in VOEM we found out that this factor is one of the most important factors which help a VO to get closer to ultimate excellence.

- "Teams" criteria in VOEM are somehow similar to the "People" factor in EFQM. Functions and statements in "Teams" are much wider in VOEM compare to EFQM. For example as we mentioned in chapter 2 some of the statements in "People" factor of EFQM have been covered by 3 factors in VOEM like, Leadership, Teams and Knowledge.

- "Knowledge" criteria are totally new in VOEM compare to EFQM. To have this factor in the model we used the extensive literature review and analyzed findings in the interviews and expert meeting. Beside this, we observed the importance of such a factor in field experiment. Based on our discussion in chapter 2, some of the statements in this factor are new but the rest would be quite similar to sub-criteria in people factor in EFQM.

- "Environment" factor in VOEM is a combination of statements which emphasized on the importance of stakeholders, customers, supplier, partner, and market. In EFQM there is a factor called Partnerships and Resources but not quite in the same area which have been covered by ICT, Results and Knowledge in VOEM.

- "Process" factor in VOEM is somehow same to the "Process" factor in EFQM. Statements in this factor in EFQM have been presented by Process and Environment in VOEM.

- Regarding the "Results factor" in VOEM, the most important fact is that, 4 Results factor in EFQM have been replaced (centralized) with 1 main criteria in VOEM. While EFQM have 4 results factor (Customer Results, People Results, Society Results and Key Performance Results), in VOEM we only have"RESULT" criteria but we have covered all the 4 different aspects of it in the statements of this factor.

One of the other interesting outcomes of this study was where we analyzed to see if there is any difference between age, gender, position … groups in responding to the survey. For

example male experts gave more importance to leadership factor (Totally) in excellence model compare to females. In the same way we found out that Male experts gave more importance to ICT framework factor in excellence model compare to females. Also from Position point of view in the VOEM, Team members gave more importance to Leadership compare to Project managers which surprised us. We expected that leaders would give their position more importance than other positions. We widely discussed these outcomes in chapter 5.

5.3. Virtual Organization excellence model VS. EFQM model:

In chapter 1 we discussed about total quality management literature and EFQM. We discussed that there is a huge need in companies to have a road map or a standard model to compare them to and improve their core competencies by implementing them. Before Business excellence models there was many companies that used and implemented ISO 9001 Standard but in the past 10 years more and more of them decided to work with the models like EFQM. Implementing such a model would have some advantages and disadvantages that we are going to cover in this section

While a discussion in expert meeting, a quality manager believed that he would always support the implementation of Excellence Models because they look at the business as a whole and how it operates with an intention of focusing on best practice. This person also believed that implementing of such models like EFQM transforms the way a company operates and will help them to be realistic , accelerates achieve the high scores and see the transformation of the business. He also mentioned that the organization must use these models for the business and not for the awards!

One of the other advantages of the new generation of Business excellence models (EFQM) is the way that they are compatible with the last generation standards (ISO). While ISO standards helps to ensure that customers get consistent good quality products and services and this is important because this brings many business benefits, also there is no conflict of implementing of ISO 9001 and EFQM. Besides this good quality this is worth to say that EFQM model isn´t an alternative to ISO 9001, but ISO 9001 is a good basic for the EFQM model.

Besides their compatibility, there is difference between ISO and EFQM that worth mentioning here. ISO, by nature, is a standard, and standards rarely drive Excellence. Naturally that depends a bit on the interpretation of the standard; some companies do more and some just the minimum. But the key difference between them is that the EFQM model looks at the whole Management System of an organization, the alignment of all enabler criteria and their impact on the results criteria, and not only at the Quality Management System. No standard being used for certification can assess results in order to decide that this organization will get the certificate or not.

Other difference came to reality just when an organization wants to establish and implement the ISO standard. Compare to EFQM it takes much longer to implement the system and to

ensure it is solid and working for the purpose it was designed for. Compare to this, EFQM is a comprehensive improvement tool without a ceiling limits that leave organization to achieve good business results and easily track the key enabler processes. So, compare to ISO, EFQM model is an easer tool that if used properly, acts as the better organizational management system. EFQM gives organizations the characteristics it deserves to achieve and the outcome that it brings when an organization reaches the excellence standard.

The EFQM model will help organizations to balance the needs and expectations of all internal and external stakeholders, while at the same time putting results as organization's first priority. Regarding self-assessment, this model offers a unique tool that help organizations to ensure internal control and effectiveness, as well as best prepare for external assessments. However, this process on practice is highly sensitive to the competence of Internal Assessors and the organization's willingness to learn and improve.

Besides all the benefits of Business excellence models that would be interesting to look into the other side of the excellence models and see if they have any limitations. One potential limitation of existing Business Excellence Models is related to the poor performance of past MBNQA winners (companies) such as Cadillac, Federal Express, Wallace and Motorola. The kind of results that they achieved, have led some management experts, excellence consultant and professionals to question the value of such models that are the core of some awards. This kind of examples led us to come to this conclusion that even if the use of Business Excellence Models can produce financial and non-financial benefits to an organization but there is no guarantee for long-term success.

Besides what we mentioned regarding advantages of EFQM there is other research indication the potential weaknesses related to the operations of self-assessment of these models. Some of these weaknesses came from Human Resources of an organization and some of them came from the structure of the organization itself, for example sophisticated assessment criteria, excessive paperwork, lack of infrastructure, excessive bureaucracy, time consuming, and a lack of focus.

Based on our literature review combined with the results of expert's interview and meeting we came to realize that the existing Business excellence models are essentially non-prescriptive frameworks designed to assess organizations in the process of moving toward excellence and they will not provide specific guidelines for those organizations. This is one of the main limitations of such models because when organizations go through self-assessment, this would be the best time and place when they could be ready to change what is going wrong but these models only would say that we could not say what to do!

Based on what said, companies have to find their own ways to implement changes to achieve better results and they also have to find new ways to involve their employees in the regular assessments.

Other biggest limitation of models like EFQM is the lack of human resource involvement in the preparing and assessment while "People" is one of the most important criteria inside

molds. The biggest reason is the way that statements designed, for example EFQM model and VOEM that we proposed in this study, designed in a way to summarize al the possible concepts in a short statement and this may reduce the understandability of the whole sub-criteria's for non excellence experts! This may seem much more important when we pay attention to the fact that cooperation and teamwork are necessary ingredients for successful Business Excellence Models initiatives.

The topic of limitation of EFQM was one of the most challenging ones as there were many pros and cons for it. Here we will discuss about couple of most important of those limitations. As EFQM is a generic and non prescriptive model so successful implementation depends upon many critical success factors like, rationale behind EFQM adoption, commitment and involvement of leadership, quality of assessors, adequate governance around excellence, project mode implementation, integration with methodologies, frameworks, tools and techniques helping in adopting/adapting, whenever applicable, good practices stated in the EFQM criteria...etc. this limitation of being generic makes model static and many enablers do not find matching result in result criteria.

In an interview with an EFQM assessor, he believed that there are no disadvantages of the model and there is only shortcoming in misunderstanding and misconception about the model. Beside this, he also believed that Business Excellence model does not guarantee Business results (profits) and this could not be disadvantage. Also the fact that EFQM focused on What Excellent organizations do rather than how they do it. This would help firms to choose the way it should be implemented (How) using adequate frameworks, methodologies, models, management systems and/or standards which best fit with their needs and which allow them to achieve their strategic objectives.

Regarding the criteria of the VOEM and EFQM model there was a discussion of why innovation is not among enabler criteria despite of the major role in organization's productivity and performance. Innovation is among the eight elements of the fundamental concepts but not in the main model. Also being a static model that would not provide insight for strategies formulation based on changes in external and internal environment may cause challenges for firms. Giving what many experts called helicopter view may be the reason why many organizations finally end up for chasing awards to grab top management support.

If we look at this model from beholders point of view, there are some challenges in the implementing of EFQM:

1. Results of implementation of EFQM are can happen in long term.
2. Organization and management has to committee in terms of time & resource.
3. The cost of assessment is comparably high
4. There is a strong need for training and coaching to implement EFQM
5. The implementation of EFQM requires passion, perseverance and drive.

Based on an environmental research we conducted on the available recourses on the net, there may not be many companies in lists of successful firms on any stock exchange that put

their success down to using the EFQM Excellence Model, but that does not mean they are not using the main principles of it. But by looking at the success stories, someone who is familiar with the Excellence Model and its fundamental concepts would recognize many characteristics. So just because an organization did not strongly mentioned that they did not use the Model does not mean they did not used the Fundamental Concepts.

In the interview an EFQM expert analyzed excellence model from epistemological point of view. He said one of the main characteristics of such models by nature is that they are models and not the exact real world and they try at best only ever being approximations of that. The more we look at quality systems and models; we see their main shortcoming is in fact human frailty: arrogance, conceit, deceit, self-interest, malice, self-delusion etc. As we also raise the concept before human recourse perspective and point of view would change the result of implementing any excellence model and this could be reported as a shortcoming but companies should use these Models as a framework to help us think about our organization, not treat them just like a checklist! And according to an early winner of the UK's Quality Award talking about the Model we could say that: "Take it, shape it, and use it."

Other challenge in implementing this model would be lack of management support and understanding of the concept and the purpose of the model which is another face for poor linkage between result and enablers, more focus on enablers than results from the assessors and the applicant's point of view. These kinds of models are maybe the only structures that success in implementing on them depends of the way that it will be assessed!

The outcome of the assessment would also depend on the assessor's qualifications and experience. They need to really avoid the poor linkage and alignment between the strategic objectives of the organization and the results criteria. Also during the assessment the assessors focus more on the past by checking the evidences and this would be another perspective oriented challenge for this kind of models.

5.4. Limitations of the study and Future research agenda

As in any research, we acknowledge that our thesis has many limitations. The limitations are mainly derived from the choices made during the design and development of the study right from the literature review, the epistemological perspective that we chose, multidimensional methodology of research and statistical tool that we used to analyze our results. Based on the limitations of our study, the elements of future research could be easily derived.

First of all, we faced a clear limitation in the amount and content of Literature review of Virtual Organization. Commonly researchers used the literature of traditional organization to have a framework to develop new concepts in Virtual organization world. Or in some cases to analyze the validity of a concept in virtual organization world there was no other way but to compare to an existing subject in traditional world. It means that the literature of virtual organization is developing with the help of existing literature of traditional organization and there are still many gaps in this domain.

In this study we needed a pure Virtual organization literature to develop a special Excellence models just for VOs. In chasing this target we should have been well conscious not to use Traditional organization. Based on this limitation this would be useful to revise this model after couple of years when the literature in Virtual organization world got stronger.

Also, we cannot deny the limitations of the EFQM model as it a managerial tool: it can increase the chances of success, but not guarantee it. The model was evaluated on many organizations but there was not an evidence of evaluation virtual organizations. We recognize this limitation as there was a little evidence supporting the necessity of having an Excellence model for virtual organization or offering a solution for it to conduct a comparison.

Another clear limitation of our research was the characteristics of the sample that we discussed at the beginning of this chapter. After receiving the responses we found out that among 352 respondents in terms of Position, 159 were Leaders (42%), 125 were Managers (35%), 31 were Project managers (8.8%) and 37 were Team managers (10%). This is clearly affects the results to be more from the leader's point of view. And for the future studies that would be useful, trying to balance the survey sample in terms of position and then choose the respondents.

As we discussed in the chapter 2 (part 2), based on the limitations of sample selection, in the available time we tried all the possible methods of contacting VO's to have their agreement for filling the questionnaire but after final step of response collection we found out that among 352 respondents in terms of Company type, 138 were working in Traditional organization (39%), 122 were in Virtual organization (34%) and 92 were working in Hybrid organization (26%). To be more accurate having more respondent from Virtual organization could have been a better sign of the model accuracy but as we mentioned above finding Virtual Organization members contact information was a limitation in this way.

On the other hand participants who filled the questionnaire came from different market segments. Based on the diversity of these experts, it is difficult to determine whether or not the current findings were grounded in any one of these distinguishing areas, or possibly even the interaction between them all.

As we used extensive literature review (which was quite similar to meta-analysis), this method in the data collection pushed us to focus only on published journal papers and had omitted websites and working papers. Therefore, it is possible that some factors were missed in this process. For example finding more evidence about customers and results could make a change in the model.

Also the generalisability of the findings may be limited along several dimensions. The cross sectoral approach that we chose in designing this model (similar to EFQM) didn't allow us to be more precise in the kind of Virtual organization. We assume that the results will apply to all kind of virtual organization. As this was a limitation in the model this accuracy needs to be examined for other type of VOs. This may result different pattern of finding.

Because the task of data collection was performed mostly by online questionnaire and there were a limited number of interviews, it was a limitation in our study. As an interviewee in one of the interview stated "I think if I have done this questionnaire online it could be less clear for me, and now that we are doing this face to face I can give much accurate scores". So in future studies this could be done more by face to face interview to see if there will be any change in the results.

Due to the comprehensive nature of the survey the instrument was designed to address several variables so the length of questionnaire was one of the limitations. Future studies could be done on each of the criteria to be shorter and more to the specific point.

For the future studies, according to the basis of the results of the analysis, we have developed research avenues to challenge the field inside of the each main criteria of the VOEM can provide research opportunities. The EFQM model is not a narrow performance management tool, and there is a lack of guidelines for identifying problems, so future research could be on preparing more guide line for Virtual organization and methods that they can use this model.

Also in the literature review there was few studies targeting the new forms of "control in virtual world" and this area stays rather general/vague so for future research this could be an interesting topic to investigate in VO world.

Future research also can be conducted to examine whether or not communication, trust or customers could be one of the main criteria's of the model that affects the productivity and excellence in the Virtual organization.

Additionally, in the future researches it could be useful to consider the use of a case study as the main data collection method to implement the VOEM and perform a more in depth qualitative comparison between the Virtual organization performance before and after this implementation.

In this research we reviewed the relationships between elements of EFQM and then investigated any possible relation between the elements of the VOEM. The results indicated that there are strong relationships between elements in couple of elements and most of them were in the medium level. This result can be used as a basis for developing further research searching each of these relations and focus on the strength of them

Such future studies are aimed to enrich the concept of Virtual Organization Excellence Model (VOEM) and create a fundamental scientific ground needed to study and implement this model.

Important note regarding the methodology of this thesis:

As we mentioned above, the general objective of this PhD study is to develop a business excellence model for Virtual organizations. In order to achive this goal we designed a research process mainly to develop a model to help VOs toward excellence. In this process

we worked with VO, EFQM and Excellence practitioners and this led us to more practical action oriented study rather than a pure academic results.

A reader with less working experience with EFQM framework in real organizations assessment, who expects to see a pure academic results would think that in some parts of the study statistical analyses are very extensive (specifically in the relation's model) and we did not use it in the designing of the framework itself. This is a natural reaction!

We tried to develop a VO excellence model to be a framework that assessors could assess virtual organization based on it right away. All the survey data and analysis in chapter 3 helped us to create a model which could be interpreted as the skeleton of VO and how the elements inside this kind of firms work. But we still needed a skin for this model to see how it looks like while we look at it with EFQM glasses.

The model that we presented in chapter 4 (Level 1) was the skin of this framework and not necessarily 100 percent containing all the relations. This is also true in case of all the versions of EFQM framework. This model never showed the skeleton of organization and remained on the skin of the model on purpose. According to EFQM foundation this is exactly the quality that keeps this model globally accurate and accepted.

Likewise this is applicable on the way that we designed the VOEM's questionnaire. In the extensive Literature review section, we discussed about the fact that we extracted statements from literature using (imaginary) EFQM glasses, to identify and chose facts which could be applicable in the EFQM framework (which we will design for the virtual organizations).

This explanation was necessary for the scientific readers who expect to see all the results have a kind of reflection on the final framework. For example at the end of chapter 3 we have the correlation models as a result of the survey and in chapter 4 we had the main VOEM, Fundamental values, RADAR scoring matrix, etc. But the most important fact is that designing the final model was purely based on facts from field experiment, survey analysis, interviews and extensive literature review and without these steps developing VOEM would be impossible.

Chapter 4 of this thesis contains all the tools that assessors need to assess a virtual organization, which was the main goal of this study.

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Appendixes

Appendix A. Original scales for measuring the EFQM criteria

1. Leadership	**1a.** Leaders develop the mission, vision, values and ethics and are role models for a culture of Excellence Managers encourage employee empowerment and autonomy Managers participate and give support to continuous improvement processes Managers collaborate in quality training by teaching people at lower hierarchical levels Managers ensure that all members of the company have a clear idea of what the company's position in the market should be
	1b. Leaders are personally involved in ensuring the organization's management system is developed, implemented and continuously improved Managers become involved in running the company as a set of interrelated processes, all of them responsible for quality Managers ensure that employees are capable of taking initiatives and assimilating better ways of doing their jobs
	1c. Leaders interact with customers, partners and representatives of society Managers take part in continuous improvement processes, even when these activities go beyond managerial responsibilities Satisfaction of current and future customers ensures the competitive success of the company To improve in a particular aspect, we collaborate with other companies to help us with the improvement
	1d. Leaders reinforce a culture of excellence with the organization's people There is a strong communicative culture throughout all areas of the organization The involvement of workers can only be achieved if managers are the first to show commitment, practicing what they preach Managers behave in a way that allows the integration and mobilization of members of a team
	1e. Leaders identify and champion organizational change Continuous improvement and change are necessary even when good results are being obtained Managers stimulate the continuous improvement of products and processes Managers continuously acquire and update knowledge that is valuable for the organization Managers act in a way that makes it easier for employees to accept proposed changes voluntarily
2. Policy and strategy	2a. Policy and strategy are based on the present and future needs and expectations of stakeholders The establishment of organizational objectives takes into account employee opinions The establishment of organizational objectives takes into account external opinions Effective management is based on information about customers Customers' needs are taken into account when establishing objectives
	2b. Policy and strategy are based on information from performance measurement, research, learning and external related activities Continuous improvement processes are based on a systematic assessment of organizational effectiveness Benchmarking techniques are used to establish improvement standards and objectives* Systematic measurement of quality and non-quality costs is carried out Self-assessment processes take place on a regular basis* Information systems are in place to capture external information (about customers and markets)
	2c. Policy and Strategy are developed, reviewed and updated Systematic procedures are in place to plan, evaluate and control organizational goal achievements Quality strategies affect all organizational areas and managerial activities Quality objectives stem from long-term strategic plans The organization has formal strategic plans* Managers favor consensus about relevant objectives and future projects

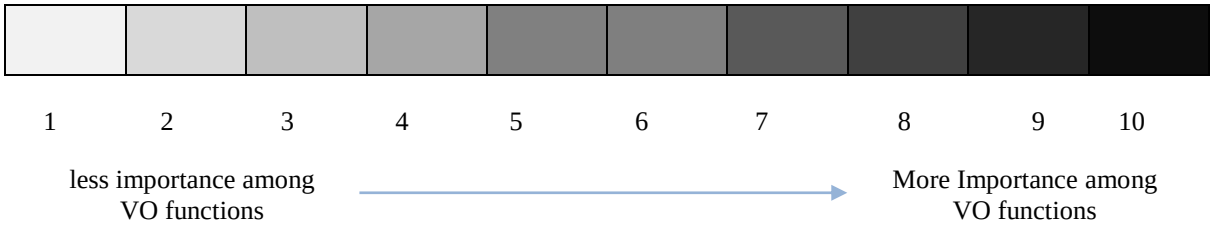
	2d. Policy and Strategy are communicated and deployed through a framework of key processes Organizational processes and their interrelationships are identified Quality policies are translated into a set of specific and measurable objectives* Managers inform employees about the quality strategy Every member in the organization knows the organizational mission and objectives
3. People	3a. People resources are planned, managed and improved Formal processes are used (such as attitude surveys or employee briefing) to find out employee opinions Emphasis is placed on recruiting highly skilled employees
	3b. People's knowledge and competences are identified, developed and sustained Specific quality training is offered to employees Employees continuously update their skills in their specific area of knowledge Extensive training means are provided for employees
	3c. People are involved and empowered Employees are allowed to decide how the work is done Employee opinions are taken into account when defining organizational objectives Employees are given the opportunity to suggest and implement solutions to work problems Employee autonomy and participation is encouraged Teamwork is common practice
	3d. People and the organization have a dialogue Formal communication channels are in place to provide organizational areas with information about customers' needs Formal communication procedures are established with staff, customers and suppliers Employees have access to information about quality results Employees maintain fluid communication with one another, going beyond the formal structure of the organization Employees have worked together for a long time, which facilitates good co-ordination between them* Internal communication is totally open and transparent Employees voluntarily pass on useful information between one another
	3e. People are rewarded, recognized and cared for Managers explicitly recognize employees' achievements at work
4. Partnerships and resources	4a. External partnerships are managed Quality agreements with suppliers are established Cooperation with suppliers provides the organization with high quality raw materials and resources Relationships with customers and suppliers allow the organization to have rapid access to information about new products and technology The organization has a high capacity for external cooperation
	4b. Finances are managed
	4c. Buildings, equipment and materials are managed
	4d. Technology is managed
	4e. Information and knowledge are managed Policy and strategy guides the definition of operative and financial objectives Inventory levels are high Intensive efforts are made to guarantee high quality raw materials Frequent technological innovations are implemented Efforts are made to know what the workforce needs in terms of information and resources*
5. Processes	5a. Processes are systematically designed and managed Work methods and organizational process are explicitly defined There is comprehensive documentation about work methods and organizational processes Quality manuals and organizational processes are periodically revised Systems of indicators are in place to revise changes in processes* Work processes exist that promote efficient behavior patterns throughout the organization
	5b. Processes are improved, as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders Development and innovation of production processes is emphasized

	5c, 5d, 5e. Products and Services are designed, developed, produced and delivered based on customers' needs 5c. Products and Services are designed and developed based on customer needs and expectations 5e. Customer relationships are managed and enhanced
	5d. Products and Services are produced, delivered and serviced The organization knows which products and services customers need The organization is oriented towards the fulfillment of customers' expectations and needs Product design provides customers with high utility The organization is able to develop new products or services ahead of competitors* The products' valuable features are superior to those of competitors Standardized systems are in place to deal with customer complaints Marketing techniques and methods are developed*
6. Customer results	Customer satisfaction has improved Customer consolidation has improved Communication with customers has improved Customer complaints have decreased Services offered to customers are better than competitors*
7. People results	V7a. Employee motivation and commitment Employee willingness to work extra time has improved High employee organizational commitment has improved
	V7b. Employee achievement Employees identify and provide solutions to work problems Employees share organizational values Employees show high levels of initiative
	V7c. Employee satisfaction Employee absenteeism has decreased Employee turnover has decreased Employee opinions contribute to improving work performance* Employees have high levels of know-how* Communication with employees has improved* Employee satisfaction has improved* Employee involvement at work has improved*
8. Society results	Protection of environment has improved Noise levels have decreased Pollution levels have decreased The organization has a positive impact in society*
9. Key performance	V9a. Financial results Market share has improved Sales per employee have improved Profit levels have improved There has been a noticeable improvement in financial results*
	V9b. External results The number of suppliers has decreased Quality of raw materials has improved Relationships with suppliers have improved Supplier management has improved
	V9c. Results on processes Process efficiency has improved Knowledge about efficient operation management has improved Recorded time has improved*

Note: The scale for measuring ''Partnership and Resources'' criteria was composed of two sub-criteria: ''External partnerships'' (sub-criterion 4a), and a combined sub-criterion (4b, 4c, 4d and 4e) called ''Internal resources''. This two-dimensional proposal is in accordance with the ''Partnership and Resources'' EFQM criterion definition: ''Excellent organizations plan and manage External Partnerships, suppliers and Internal Resources in order to support policy and strategy and the effective operation of processes'' (italics added).

The ''Process'' criterion was formed by three sub-criteria: 5a, 5b, and the combined sub-criterion 5c, 5d, 5e called ''Products and Services are designed, developed, produced and serviced based on customer needs''.

Appendix B: Virtual Organization Excellence Questionnaire



NO	Point (Function)
1	Identify and input data from projects, communications, environment, staff experience, feedback, share recourses (like calendars), teams, customers, suppliers, competitors, standards, lessons learned, benchmarking, suggestions, innovations , scientific documents, ... 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
2	Having an ICT framework providing: email, Instant Messaging, groupware/Shared Services ,web conferencing, remote access, file transfer, report generating, teleconferencing ,voice- data conversations at the same time and well graphically designed to be user-friendly like a "Real" physical space 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
3	Leader creates clear strategy, policy, mission, values, goals, objectives, culture, behaviors, performance metrics, VO governance principles, quality improvement rules, based on the present and future expectations of all stakeholders. Leader also should review and update them periodically 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
4	Processes designed and get managed in order to create best usage of resources, reduce staff time and costs, distribute information and knowledge, cope with location and time zone barriers, reducing and optimizing physical, economic and financial resources, find out employee opinions, and represent flatness and agility and create high degree of cohesion in VO. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
5	Analyzing VO results like quality management, adherence to preset budget, lower costs, higher productivity, accuracy of financial contracts, development of new business, mission clarity. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
6	Leaders participating, supervising, supporting and giving feedback about continuous excellence improvement processes based on content of ICT framework. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
7	Comprehensive documentation of work methods and organizational processes in all angels. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
8	Checking VO's policy and strategy to see if they are helping organization to get to its ultimate goal 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
9	A powerful reward system structure in which people are rewarded, recognized and cared for their achievements at work based on: meeting customer's and the organization's objective, skill-based criteria, learn the necessary new skills. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
10	Data categorizations are reviewed to prevent any redundancy and share openly via all channels inside VO. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
11	Plan customer's full experience from ordering and assigning the best team for the project to final delivery. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐

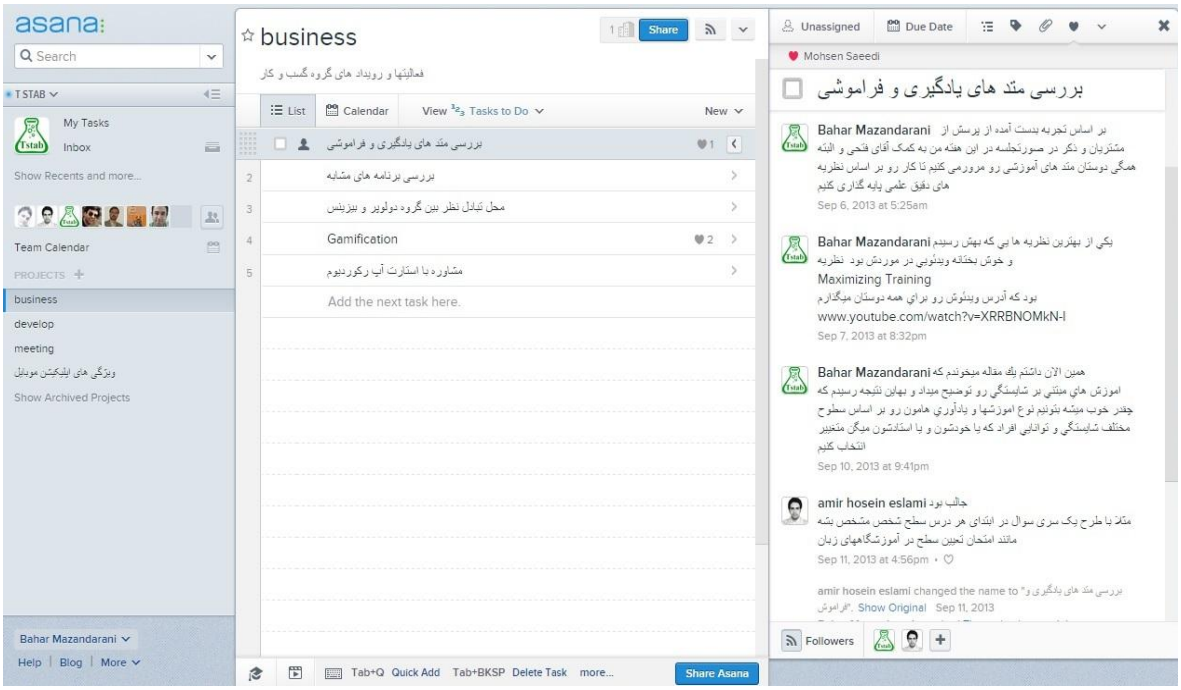
12	ICTF having cloud computing ability as SaaS (Software as a service), PaaS (Platform as a service) or IaaS (Infrastructure as a service) to decrease system errors and threats such as hardware damage, supply failure, fire, flood, etc compared to in-house server . 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
13	There are open and transparent formal communication procedures within staff, customers, and suppliers. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
14	Creating a special training (just-in-time learning) rules and motivations like: self managing skills, intercultural communication and meeting, trust building, project management skills, ICT framework training, language and balance between Technical and Interpersonal Skills, based on each position competences . 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
15	Checking financial results, profitability (costs versus revenue), improvement of products or services and sales per employee, market share growth. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
16	Creating an access point for customers in VO's portal to see and comment in different phase of project. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
17	Creating a transparent VO which each member can "see" and "feel" what is happening above and around. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
18	Availability of dashboard of results (financial, recourses, etc) for leaders decision making based on all input data. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
19	Leader clearly determining VO's structure, business/collaboration process modeling, access levels (assets/resources, intellectual property, etc.) for each position using best potentials in ICT framework. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
20	Processes are fitting Task-Technology-Structure concept of VO. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
21	Creating stable trust that means internalization of VO norms and practices and willingness to cooperate, share, and give feed back to others despite of high turnover of VO members 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
22	Review environmental feedback like any change in number of customers, suppliers, partners, competitors, and their satisfaction. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
23	Create a unique VO culture beyond gender, age, ethnic background, personal tastes or preferences, language, theoretical framework, history, individual assumptions, values, biases, goals, styles. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
24	Deploying policy and strategy through processes to make sure every member works toward VO's mission and objectives. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
25	To increase quality of virtual working ICTF need to be Technology-Task-Structure fit. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
26	All members are part of creating knowledge; They use recent data and reflect the results after finalizing the projects. These new data get identified and categorized for future improvement 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐

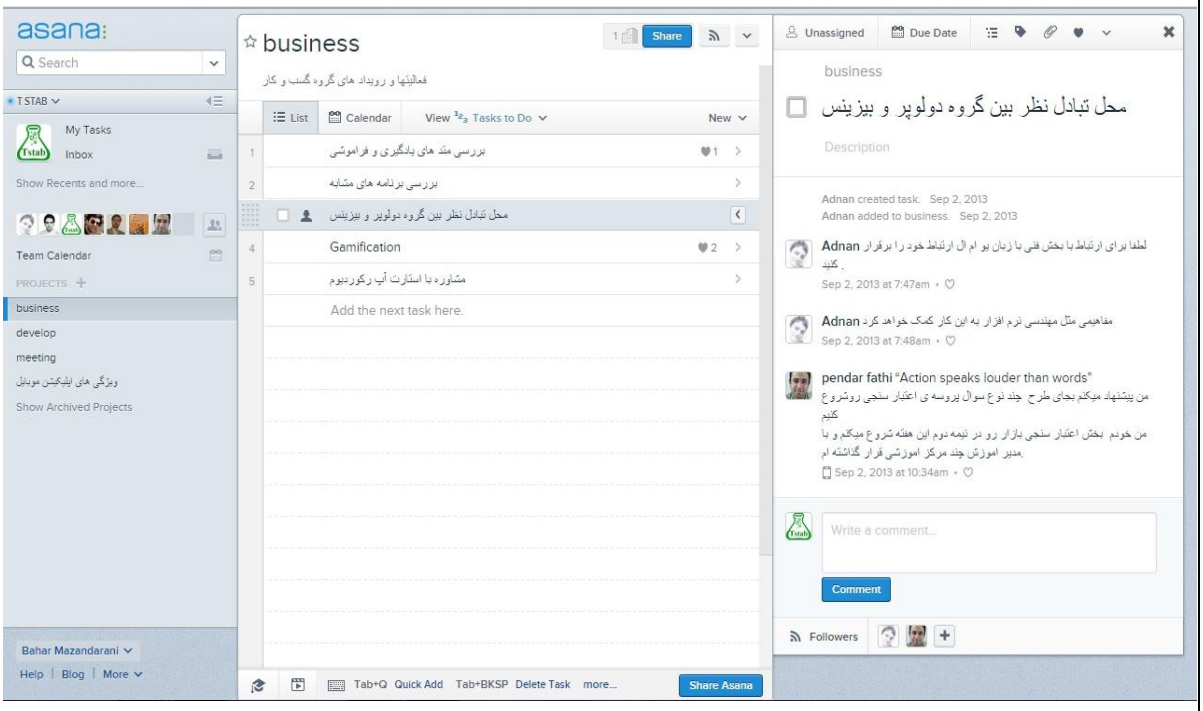
27	Customers get full 24/7 support after purchasing their product or service. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
28	Assign each VO member a level or permission that shows who can access what in knowledge database. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
29	Leaders clearly defined job descriptions, performance appraisal, career development, compensation, flexible work arrangements, recruitment, training, professional skills development, benefits and compensation, ensuring legal compliance according to VO's policy and strategy. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
30	Customers, partners, suppliers play an important roles in VO process at different stage. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
31	VO members must have ability to analyze, manage data, plan, and organize self work to correspond to team schedules, report progress and problems, monitor and control costs, take actions to get back on track, document and share learning. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
32	Enrich data and knowledge by making it a must to use and share data by any individual or group 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
33	VO must have common inner criteria with partners like: matching goals, algorithms, skills and capabilities, technical and economical preferences, common collaborating infrastructure and commitment to provide best quality 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
34	VO Leader is more a coach and moderators of functions, they are sensitive to member's schedule, gets to know them, have one-to-one contact with all members to build relationships, inspire them to have a positive competition, using effective and suitable motivation methods to build trust. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
35	Placing a systems of indicators to revise changes in processes 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
36	Having communication, awareness, and sensitivity between members despite cultural differences, understanding how cultural perspectives influence work and collaboration, and adjusting communication approach based on those differences, when appropriate. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
37	Any higher performance in production timing from order to delivery, improvement in customize product or service, decrease resources consumption, reduced staff time and costs, improve process efficiency and productivity. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
38	Having self management skills like: ability to establish personal and professional priorities and goals, recognizing opportunities for individual learning and growth, taking the initiative to change working methods and processes, social adequacies. Being adaptable, plan-ahead, well organized, flexible, low levels of neuroticism, resilient, extroverted, self-confident, and open to new experiences highly self-motivated, developing plans to meet those goals, executing plans, multi-tasking, influential, strong sense of urgency and drive. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
39	Having common outer criteria with partners like: cost requirement, collaboration history, reliability indicators, and readiness to join the collaborative process. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
40	Leaders relate to members at their own levels, appreciates their opinions and suggestions, care about their problems, expresses a personal interest in them, maintain a consistent trust, providing feedback.

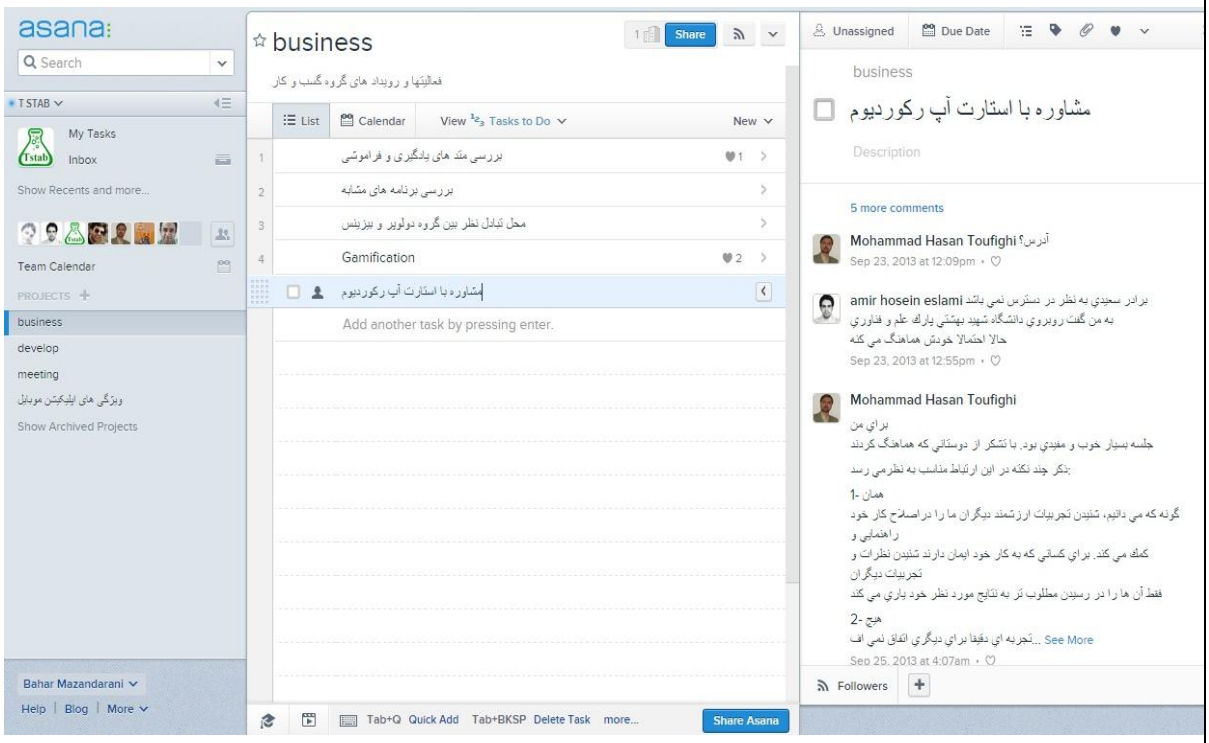
	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
41	Providing members with the flexibility in where and when work is performed and reported trough (text, voice, and video) in ICTF. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
42	Maximizing the diversity of skills, access to a greater pool of talent optimizing the fit of individuals to teams, increase trust, quantifiable measures of evaluating individual performance on VT 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
43	Creating a united team spirit & belonging which prevents isolation and detachment with providing feedback to leader and other members about their performance using communication tools like text, chat, email and collaborative software systems, videoconferencing, preparing face-to-face meeting, voicemail messages. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
44	Observe any change in quality of leadership roles execution, virtual team management, coaching new team members, suggesting internal quality improvement strategies opportunities for promotion 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
45	Managing, maintaining and developing the ICTF periodically (have access to 24/7 support) 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
46	Leaders clarify communication protocols (what, to whom, when, and how), supervise and give feedback. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
47	Analyzing market to develop new products or services ahead of competitors. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
48	Providing each VO member a clear identity and access level in ICTF while all actions in the system are recordable and traceable. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
49	Providing VO with detailed information about market, competitors, legal and environmental issues and all the partners comments and feedbacks 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
50	Provide all partners or suppliers with an access point in VO's portal to share knowledge 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
51	Enabling VO to get to its goal in most efficient way using less recourse in ICTF. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
52	Leaders handling all interactions with suppliers, partners, competitors and society including finding, negotiating and e-contracting (information, pre-contractual, contracting, and enactment phases). 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
53	Processes are being improved as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
54	Any increase or decrease in staff turnover, degree of task flexibility, accomplishment of assigned tasks, task efficiency , commitment and involving to the work is reviewed carefully 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
55	Comparing and revising quality of the products or service offered to customer with competitors. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
56	ICTF provides VO a high level data, information, and knowledge security in three technical, organizational, and legal dimensions.

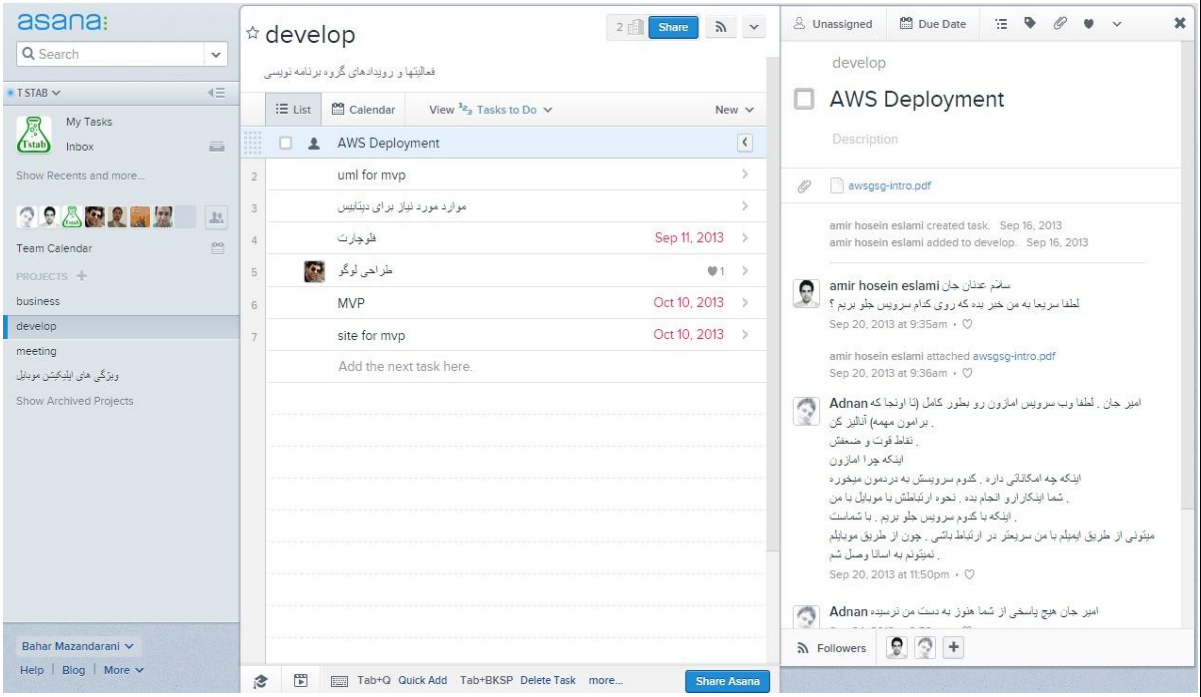
	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
57	Any change in satisfaction indicator between members like role stressors, happy relation with their supervisors, committed to VO, levels of satisfaction with peers is important. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
58	Leader chose the most appropriate and suitable ICT framework for VO. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐
59	Having an interactive relationship between employees and leaders makes possible to have clear understanding of role, see that their opinions are taken into account when defining organizational objectives, and they are involve din decision making and setting goals collectively. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐

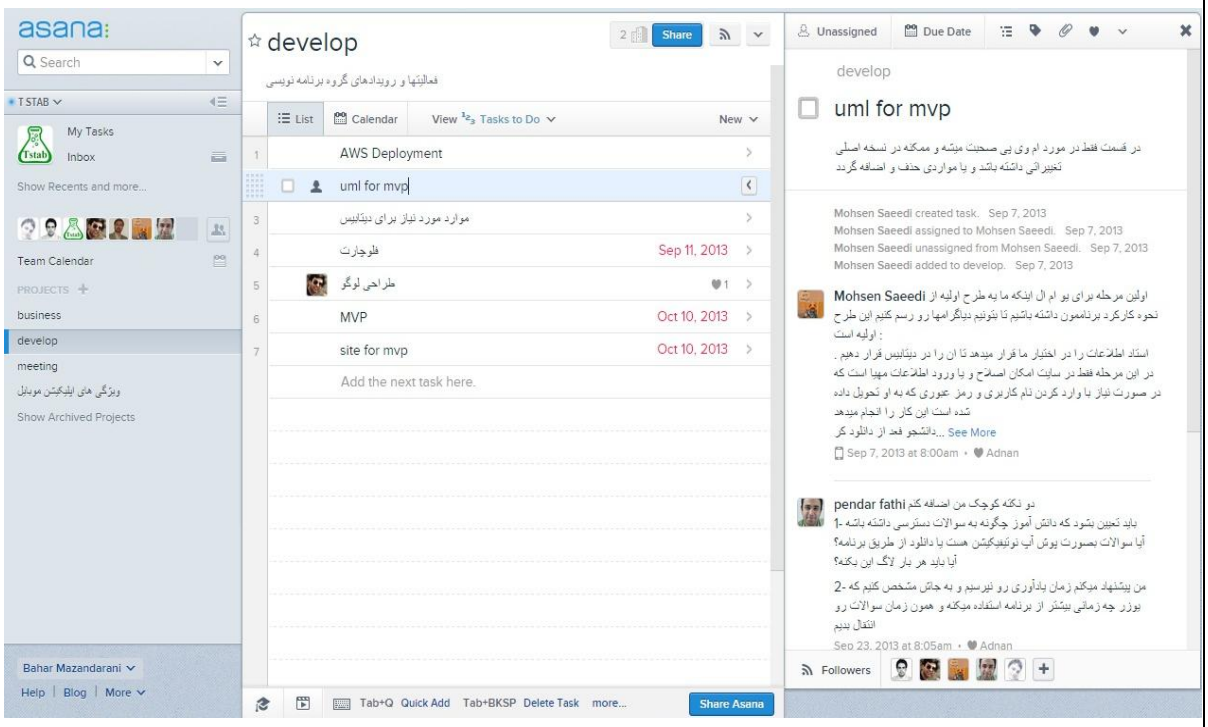
Appendix C: Evidence of Tstab Virtual Organization

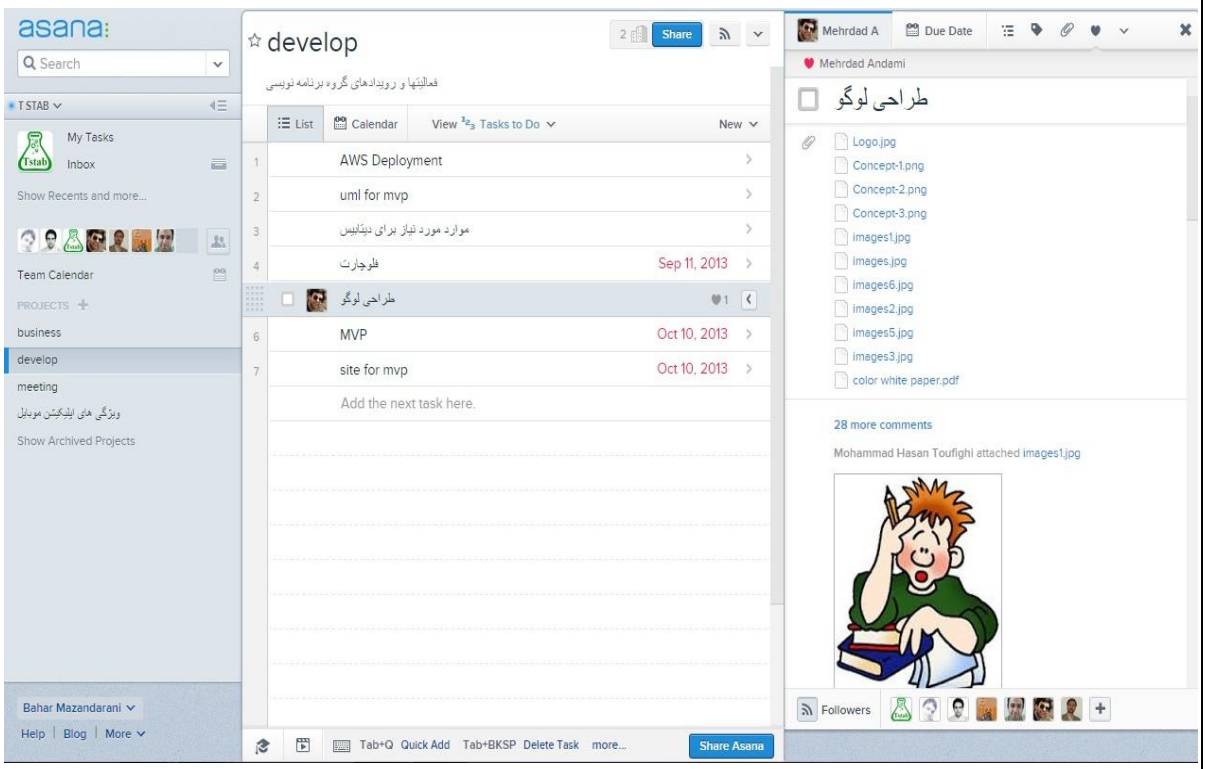


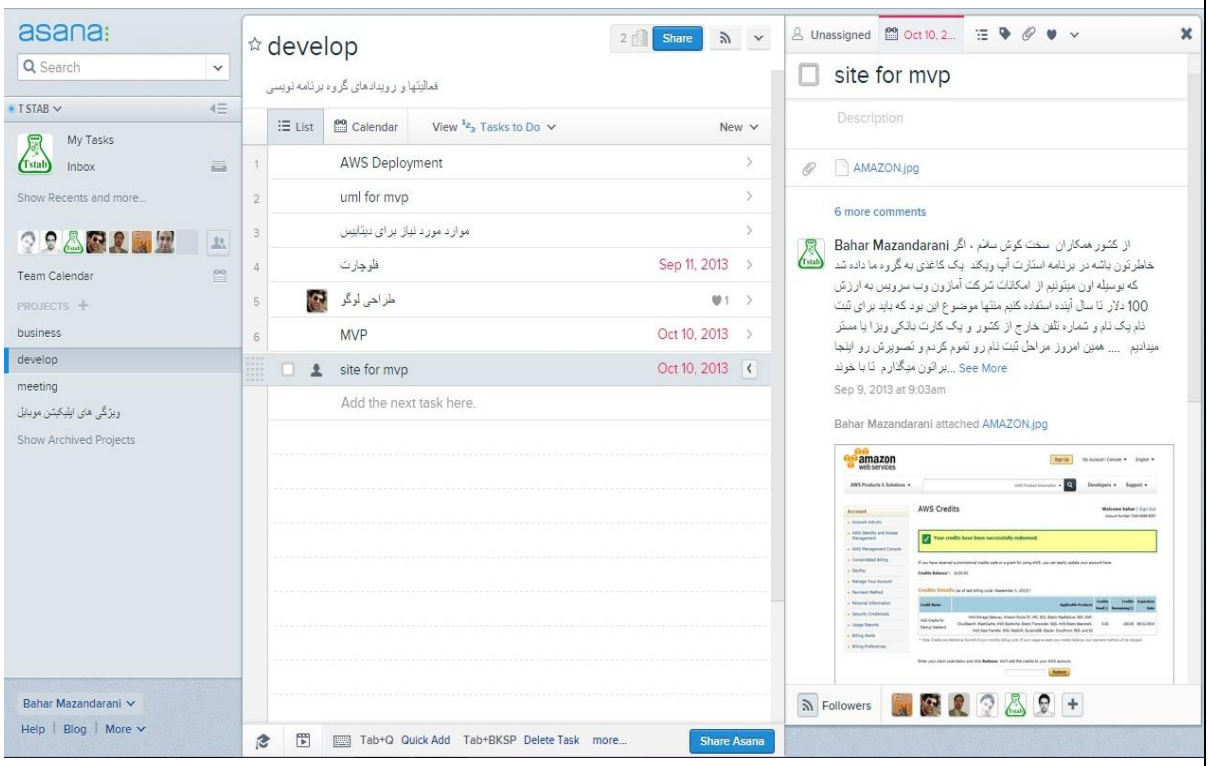


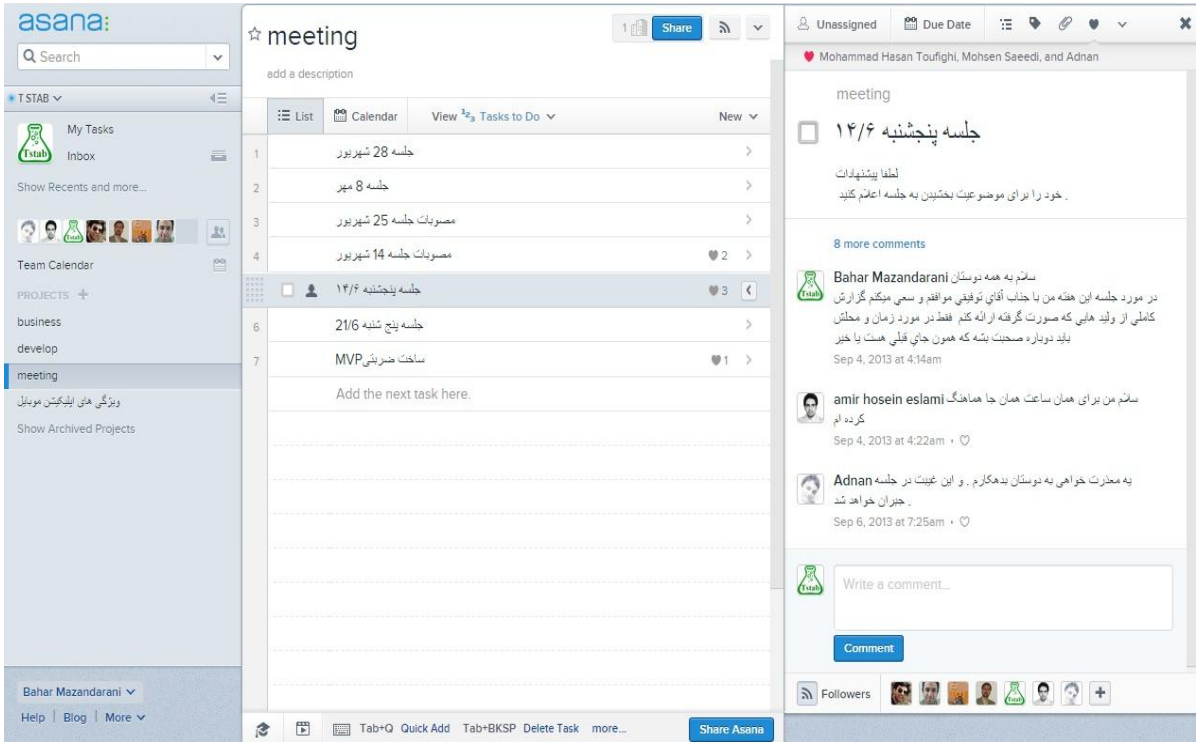


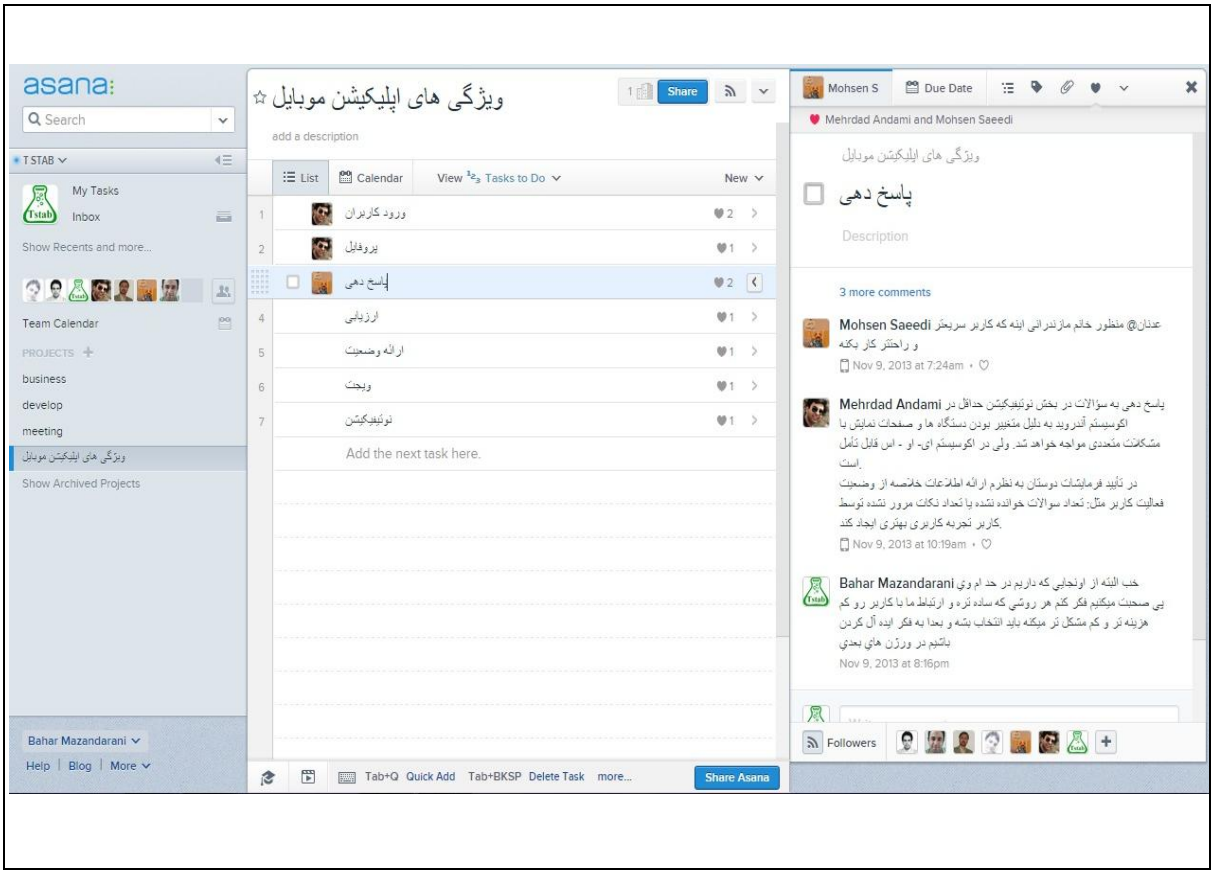












Appendix D: Model 300- Results of VO Literature Analysis

NO	Question	Point	Topic
1	Using code of conducts (request for information within 24 or 48 hours) in communication to avoid delays.	code	Content (Communication , Knowledge , recourses)
2	Communication content (mutually understandable, explicit language or face-to-face dialogue that leads to willingness to respect the other party's sincerity) important to productivity of VO	content	Content (Communication , Knowledge , recourses)
3	Communication in VO is the process of transferring information, meaning, and understanding between two or more parties	mean	Content (Communication , Knowledge , recourses)
4	In VO communication should be open and with channels	openness	Content (Communication , Knowledge , recourses)
5	VT should have communication in a way that brings unity ,team collaboration	team working	Content (Communication , Knowledge , recourses)
6	The organization is able to develop new products or services ahead of competitors	agile	Environment (Customers, Suppliers , competitors …)
7	The company is prepared to form alliances with partners and collaborator in the market in an attempt to achieve competitive advantage.	alliance	Environment (Customers, Suppliers , competitors …)
8	In partner management ,lack of common collaboration infrastructure, and lack of preparedness of organizations to join the collaborative process is dangerous	common	Environment (Customers, Suppliers , competitors …)
9	Partner assessment if they have matching algorithms or any common criteria	criteria	Environment (Customers, Suppliers , competitors …)
10	Supervision of customer at each step of process	customer relation	Environment (Customers, Suppliers , competitors …)
11	The project or suggested product should be well described by customers.	customer relation	Environment (Customers, Suppliers , competitors …)
12	Partner search and selection :technical, economical, reliability indicators, preferences	element	Environment (Customers, Suppliers , competitors …)
13	Partner assessment (preparedness, etc.) and consideration of collaboration history	element	Environment (Customers, Suppliers , competitors …)
14	The effect of environment on the work process	environment	Environment (Customers, Suppliers , competitors …)
15	In partner management ,lack of information like a catalogs with normalized and updated profiles of organizations is	information	Environment (Customers, Suppliers , competitors …)
16	There are Processes to Manage the knowledge that is in the VO and develop it	KM	Environment (Customers, Suppliers , competitors …)
17	Detailed information about such things as competitors' actions, other market agents' behavior, legal and environmental issues, etc is collected to help formulate strategy on the framework.	knowledge	Environment (Customers, Suppliers , competitors …)
18	Quality of the service that offered to customer always get revised and compared with competitors	PROCESSES	Environment (Customers, Suppliers , competitors …)
19	Supplier's commitment to provide best quality	supplier	Environment (Customers, Suppliers , competitors …)
20	Vo is committed to be influenced by environment and customers opinion	take feed back	Environment (Customers, Suppliers , competitors …)
21	Feedback provide a solid foundation for recognizing and rewarding teams and individuals performance		feed back
22	IT framework is able to store team members' calendars. To create VT calendar software	calendar	ICT framework
23	ITF enables Instant Messaging and Chat	characteristic	ICT framework
24	ITF enables VO with groupware/Shared Services	characteristic	ICT framework
25	ITF provides remote Access and Control for VO	characteristic	ICT framework
26	ITF provides Web Conferencing ability for VO	characteristic	ICT framework
27	ITF provides File T transfer ability	characteristic	ICT framework
28	ITF provides a whole cloud computing ability for VO	characteristic	ICT framework
29	could computing vs. own server that has system errors , natural threats such as hardware damage, supply failure, fire, flood, etc	cloud	ICT framework
30	Team communication is prioritized by the sender.	communication	ICT framework
31	synchronous medias like telephone and video conferencing communication is important	communication	ICT framework
32	IT framework contains asyncronized media such as email , file sharing ,chat software .	communication	ICT framework
33	IT framework make it possible to control individuals within the system (invisible control)	control	ICT framework
34	ICT framework in a VO designed in the way that Differing technological systems (such as differing computer operating systems) and Technical language dose not make any trouble.	design	ICT framework

35	Changing and developing IT framework	developing It frame work	ICT framework
36	Ease of message (text, voice, and video) sending.	easy communication	ICT framework
37	IT is used for electronic networking and in various processes as an enabler complementing social conditions.	enabler	ICT framework
38	IT framework gives members flexibility in where work is performed	flexible	ICT framework
39	ITF gives flexibility in where data communication take place	flexible	ICT framework
40	ITF allows voice- data conversations over the same line at the same time	flexible	ICT framework
41	ITF Make real-time voice conversation possible without knowing the physical location of the recipient	flexible	ICT framework
42	Totally described identity for each employee in the IT framework.	full profile	ICT framework
43	all the VO's requirements to be virtually integrated in a business network being reviewed and improved periodically	Improvement	ICT framework
44	Well Graphically designed the IT framework.	It framework design	ICT framework
45	24 /7 IT framework support.	IT support	ICT framework
46	There is updated quality-related data available to all members of the company.	knowledge	ICT framework
47	ITF makes it possible to send short notes and documents without knowing the physical location of the recipient	location	ICT framework
48	VO's IT framework and all tech attached is managed, maintained and develop periodically	maintain	ICT framework
49	Possibility of private message sending.	private message	ICT framework
50	Create tracks and footprints in Vo like a physical space to help teams feel "Real".	reality	ICT framework
51	A recorded version of each voice communications are available for all other parties that were unavailable at the time of the call	record	ICT framework
52	IT framework must make relationship building possible prior to the start of a project	relation making	ICT framework
53	VO has reliable communication and collaboration tools for all team members.	reliable	ICT framework
54	Report generating out of the framework	report generating	ICT framework
55	Clear rules or expectations when using certain types of technology	rules	ICT framework
56	High level of Data ,information and knowledge security	security	ICT framework
57	It framework should be Secure	security	ICT framework
58	The safety level of the VO member organizations and their communication influences security of the entire virtual organization	security	ICT framework
59	ICT framework must secure VO from three dimensions: technical, organizational, and Legal	security	ICT framework
60	VO provides each member the same speed of access VO information and Knowledge	speed	ICT framework
61	IT framework is well designed or chosen and offers good opportunity and quality Virtual working	suitable	ICT framework
62	leader needs to consider the nature of task for choosing the appropriate technology	Tech choosing	ICT framework
63	ICT framework must provide proficiency with technical tools like: e-mail; collaborative software systems; Internet; Intranet; desktop videoconferencing systems; non-desktop videoconferencing systems; teleconferencing.	tools	ICT framework
64	ITF Enables low-cost wireless data transfer between geographically	transfer	ICT framework
65	The main frame work of VO in the internet should be user-friendly.	user-friendly	ICT framework
66	Possibility of vide conferencing between geographical despaired members.	vide conferencing	ICT framework
67	all members of a Vo share their calendars to have a united VO calendar	calendar	Content (Communication , Knowledge , recourses)
68	In VO each collaborating body have to have access to knowledge share	clarity	Content (Communication , Knowledge , recourses)
69	Knowledge in Vo should be prevent from any data and information redundancy	clarity	Content (Communication , Knowledge , recourses)
70	enhances sharing of information	clarity	Content (Communication , Knowledge , recourses)
71	International culture in knowledge bank	culture	Content (Communication , Knowledge , recourses)
72	Data and Knowledge provided by suppliers and customers are available in the IT framework	data	Content (Communication , Knowledge , recourses)
73	leader should Closely monitor changes in the environment	environment	Content (Communication , Knowledge , recourses)
74	Environment data analyzing knowledge in the Vo.	environment knowledge	Content (Communication , Knowledge , recourses)
75	Level is the point that show who can access what	K accessibility	Content (Communication ,

		leveling	Knowledge , recourses)
76	Every Done project is going to be add to the Knowledge Bank	KM	Content (Communication , Knowledge , recourses)
77	VO needs a KM system that leveraging diverse sources of expertise within and across organizational boundaries	KM	Content (Communication , Knowledge , recourses)
78	The knowledge management system helps to gather better quantity information and experience	KM	Content (Communication , Knowledge , recourses)
79	Knowledge being categorize to ease of reach	Knowledge categorization	Content (Communication , Knowledge , recourses)
80	Religious concepts are not base of creation of Knowledge and categorization	NO religious	Content (Communication , Knowledge , recourses)
81	Possibility of sharing Knowledge with other Vos	partners and supplier Km	Content (Communication , Knowledge , recourses)
82	Knowledge (teams , customer , supplier) being shared in the VO.	sharing	Content (Communication , Knowledge , recourses)
83	Provide a "line of sight." members need to "see" and feel what's happening above and around them in the organization	sharing	Content (Communication , Knowledge , recourses)
84	Place for storing information and knowledge of employees.	strength of K	Content (Communication , Knowledge , recourses)
85	There are sufficient amount of knowledge and database of VOs standards and lessons learned	sufficient	Content (Communication , Knowledge , recourses)
86	Knowledge as information that has a purpose or use is an improvement .Knowledge as the meaning that individuals and groups give to information is a richer construction.	use	Content (Communication , Knowledge , recourses)
87	VO's Policy and strategy is based on information from performance measurement, research, learning and external related activities and benchmarking and analysis market and customers	involvement in strategy	Leadership
88	Leader should clarify access control for each position in the VO	access	Leadership
89	Leaders are adhere to the mission, vision, values and ethics	adhere to goals	Leadership
90	Leaders clearly defined job descriptions, culture, performance appraisal, career development, compensation, training and flexible work arrangements.	all	Leadership
91	Leader is assertive yet not too bossy, caring, relates to members at their own levels, and maintains a consistent attitude over the life of the project	attitude	Leadership
92	Answering to all the messages send from employees	being reachable	Leadership
93	Creating a same picture for employees, customers and suppliers.	Big picture	Leadership
94	Managers ensure that all members of the company have a clear idea of company’s goals	Big picture	Leadership
95	Leaders identify and champion organizational change .	change	Leadership
96	VO leader is well traveled and probably know at least three different languages	characteristic	Leadership
97	Managers spread a strong coherence culture throughout all areas of the organization	coherence	Leadership
98	Leaders interact with customers, partners and representatives of society .	communication	Leadership
99	Leader communications conveyed a greater awareness and usage of interpersonal processes	communication	Leadership
100	Leader provides continuous feedback, engages in regular and prompt communication	communication	Leadership
101	Leaders set up Communication protocols (what to whom, when and how)	communication	Leadership
102	leaders should clarify VO communication patterns	communication	Leadership
103	all the outside and inside VO e-contracting include: information, precontractual, contracting, and enactment phases	contract	Leadership
104	Supervising the process in Vo using IT Framework.	Control	Leadership
105	VO Leader must be able to prioritize the HR activities from the cost perspective. They must learn to perform the HR functions in a cost-effective manner.	cost saving	Leadership
106	Identify and using the Cultural differences between employees.	culture	Leadership
107	Policy and Strategy are deployed through IT communication framework and processes so every member in the organization knows the organizational mission and objectives	deploy strategy	Leadership
108	leaders have some tem responsibility (the leader is sensitive to schedules of members, appreciates their opinions and suggestions, cares about member’s problems, gets to know them, and expresses a personal interest in them).	duty	Leadership
109	Conveying a good understanding of duty to the employees.	duty clarify	Leadership
110	leader clearly defines responsibilities of all members, exercises authority, and mentors virtual team members	duty clarify	Leadership
111	Managers established quality agreements with suppliers and customers(environment)	environment relation	Leadership
112	Leaders set high performance expectations like behaviors like working across boundaries and using technology effectively.	expectation	Leadership

113	Providing feedback to teams by periodic virtual meeting.	feedback	Leadership
114	leaders manage VO financially	Financial	Leadership
115	leadership should have a good strategy in Team selection	hiring skilled staff	Leadership
116	VO Leadership team planned, managed and improved People resources	HR management	Leadership
117	Leader must clarify the access levels (assets/resources, intellectual property ,etc.)	ICT framework	Leadership
118	Managers participate and give support to continuous improvement processes	improvement	Leadership
119	Inspiring employee to have a positive competition	Inspiring	Leadership
120	Leader should select best suitable IT framework for VO	it framework	Leadership
121	Leader role is to chose the most appropriate technology for VO	it framework	Leadership
122	Managers continuously acquire and update knowledge that is valuable for the organization	KM	Leadership
123	Using effective and suitable motivation method.	motivate	Leadership
124	Leadership should look into customer and suppliers constantly changing needs, and update purpose of the organization.	need	Leadership
125	leaders with VO's knowledge identify opportunity selection one to go for it	opportunity	Leadership
126	The first step in choosing partners is the alignment of the goals of the Interested Partners with the goals of the VO	partner	Leadership
127	Partner should be matching the requirements of the roles (skills and capabilities, availability and cost requirements)	partner	Leadership
128	Potential Partner should have the experience and the means of delivering to the VE as claimed.	partner	Leadership
129	Finding the right partners and establishing the necessary conditions for starting a collaboration	partners	Leadership
130	The existence of written goals, objectives, project specifications, and performance metrics; results orientation.	policy	Leadership
131	leaders should clarify design for process.	process	Leadership
132	Leader must do the business/collaboration process modeling depending on the type of collaboration BP, collaborative project, collaborative problem solving	process	Leadership
133	Managers are adhere to continues quality improvement	quality	Leadership
134	leader must have one-to-one contact with “key players”, to build relationship(Bringing in) and maintenance (create authority) and “making them stay”.	relation making	Leadership
135	Role of VO managerial team changed from traditional controlling into coaching and moderating functions .	role	Leadership
136	Leaders clearly explained quality and productivity rules for all VO members	rules	Leadership
137	Clear definition of what effective work completion means	rules	Leadership
138	VO leader should be : effective communicator, organized, skilled at relationship building	skill	Leadership
139	a leader should Communication skills : provide continuous feedback, engage in regular and prompt communication, and clarifies tasks	skill	Leadership
140	VO leader should be able to Understand : be sensitive to schedules of members, appreciates their opinions and suggestions, cares about member’s problems, gets to know them, and expresses a personal interest in them	skill	Leadership
141	VO leader should clarify roles: define responsibilities of all members, exercise authority, and mentors virtual team members	skill	Leadership
142	A VO leader should be: Living example, Coach, Business analyzer, Barrier buster, Facilitator, Results catalyst	skill	Leadership
143	VO has a clear Policy and strategy based on the present and future needs and expectations of all stakeholders	STRATEGY	Leadership
144	Leaders need to come up and redesign a clear vision and mission For VO	strategy	Leadership
145	leader must keep the HR policies and practices dynamic and flexible, fluid and receptive to changes.	STRATEGY	Leadership
146	VO leader should created Customer-oriented HR strategy: they must keep a critical focus on customer need satisfaction while framing HR policies and practices.	STRATEGY	Leadership
147	VO should remain flat structured	structure	Leadership
148	Leaders determine of a rough structure of the potential VO, looking the required competencies and capacities, organizational form and corresponding roles.	structure	Leadership
149	leaders need to clarify job characteristics, selection procedure	teams	Leadership
150	leaders should clarify training system, reward system in teams	teams	Leadership
151	Select and offer the most suitable technology to work with in VO.	Tech choosing	Leadership
152	Managers collaborate in quality training of staff	training	Leadership

153	Managers believes and implemented trainings that give members ability to assimilating better ways of doing their jobs	Training ,empowerment	Leadership
154	Create and maintain Trust between human resources of a VO.	Trust	Leadership
155	VO's Policy and Strategy are developed, reviewed and updated Systematically and periodically	update strategy	Leadership
156	Leader duty is setting up of the VO governance principles, assignment and set up of resources/activation of services and notification of the involved members	Vo governance	Leadership
157	VO Leadership should be careful with the attitude : should be assertive yet not too "bossy," caring, relates to members at their own levels, maintains a consistent attitude over the life of the project		Leadership
158	VO structure is flat and agile	agile	Processes
159	Make process give the whole energy and knowledge visible to everyone	clarity	Processes
160	process are designed to have higher degree of cohesion	cohesion	Processes
161	There are formal communication procedures within staff, customers and suppliers	communication	Processes
162	VO's Internal communication is totally open and transparent	communication	Processes
163	Process are designed and improved in the way that helps Cost saving	cost saving	Processes
164	VO Processes are explicitly defined in all angels and documented	coverage	Processes
165	The organization have process to know all about what products and services customers need	customer relation	Processes
166	Standardized systems are in place to deal with customer complaints	customer relation	Processes
167	in VO the design of process are so important	design	Processes
168	Work Processes are in a way that help efficient behavior patterns in VO	efficiency	Processes
169	Process designed and get reviewed in a way that create the best way of using all kind of resources consumption	efficiency	Processes
170	Process designed and get reviewed in a way that reduce staff time and costs	efficiency	Processes
171	process are designed to evenly distribute information and knowledge	even	Processes
172	In a VT process needs to be Task-technology-structure fit.	fit	Processes
173	Process need to give VO ability to Cope with location and time zone barriers	flexible	Processes
174	VO Processes are revised improved periodically, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders	improvement	Processes
175	Employees can have a place to communication with one another informally	informal talk	Processes
176	A dashboard of physical and financial resources are available to help managers	IT framework	Processes
177	Process are designed in the way that maximize information flow between VTs	knowledge	Processes
178	Maximizing Process Gains and Minimizing Process Losses on VT Conventional wisdom	max	Processes
179	Work process is organized around reducing and optimizing physical, economic and financial resources.	optimizing	Processes
180	There are Virtual linkages with supply chain and other partners	partners and supplier Km	Processes
181	There is Formal processes and surveys to find out employee opinions	suggestion	Processes
182	VO is performing in a way that gaining new markets or market share	all	Results (Teams, process, Customer ,leadership...)
183	Leaders must control results in Procedures, quality management, hierarchy, rules, budget, task allocation and discipline are	all	Results (Teams, process, Customer ,leadership...)
184	VO productivity is lower costs, access to a greater pool of talent, more customer intelligence and higher productivity:	all	Results (Teams, process, Customer ,leadership...)
185	VO results: product quality, reliability, customer satisfaction, adherence to preset budget and schedule constraints.	all	Results (Teams, process, Customer ,leadership...)
186	VO Performance and effectiveness : extent to Performance and satisfaction	all	Results (Teams, process, Customer ,leadership...)
187	VT performance measures: number of items produced, accuracy of financial contracts, development of new business, and customer retention as objective, quantifiable measures of evaluating individual performance on virtual teams	all	Results (Teams, process, Customer ,leadership...)
188	360-degree performance evaluations, gathering peer and customer input electronically	all	results (Teams, process, Customer ,leadership...)
189	Result :Customer satisfaction (assessed with survey data collected from actual customers).	Customer	Results (Teams, process, Customer ,leadership...)
190	Communication with customers are in progress even after products delivery	customer relation	Results (Teams, process, Customer ,leadership...)
191	Leader looks for economic results that means improvement of products or services	economic	Results (Teams, process, Customer ,leadership...)
192	Process efficiency being closely reviewed	efficiency	Results (Teams, process, Customer ,leadership...)
193	VO has a positive impact in virtual Network around	environment	Results (Teams, process, Customer ,leadership...)

194	Financial results are being closely reviewed	Financial	Results (Teams, process, Customer ,leadership...)
195	one of the important results is if VO did good financially	Financial	Results (Teams, process, Customer ,leadership...)
196	one of the most important result for a Vo is: Growth (share of the market)	growth	Results (Teams, process, Customer ,leadership...)
197	Market share improved being closely reviewed	market share	Results (Teams, process, Customer ,leadership...)
198	Improved manufacturing time and customer delivery times.	process	Results (Teams, process, Customer ,leadership...)
199	More process flexibility and productivity.	process	Results (Teams, process, Customer ,leadership...)
200	Process improved in the way that reduce all kind of resources consumption	process	Results (Teams, process, Customer ,leadership...)
201	Process improved in the way that reduced staff time and costs	process	Results (Teams, process, Customer ,leadership...)
202	Result : Process improvement (cycle time, or the time required to order and install customer hard-ware);	process	Results (Teams, process, Customer ,leadership...)
203	one of the most important result for a Vo is: Profitability (costs versus revenue generated for each travel booking)	profitability	Results (Teams, process, Customer ,leadership...)
204	Sales per employee and its improved being closely reviewed	sales	Results (Teams, process, Customer ,leadership...)
205	Employees are satisfied , committed and involved to their work	satisfaction	Results (Teams, process, Customer ,leadership...)
206	The amount of Improvement in employee on time delivery being observed	staff	Results (Teams, process, Customer ,leadership...)
207	The amount of decrees and increase in staff turnover being observed	staff	Results (Teams, process, Customer ,leadership...)
208	VT Trust (ability to rely on someone's word) will save time and prevent trouble for VO	staff	Results (Teams, process, Customer ,leadership...)
209	Staff results are the degree of task flexibility, independence, interesting work and greater opportunities	staff	Results (Teams, process, Customer ,leadership...)
210	mission clarity it can help improved work outcomes	strategy	Results (Teams, process, Customer ,leadership...)
211	Leader looks for strategic results like which is assessed in terms of revenue	strategy	Results (Teams, process, Customer ,leadership...)
212	The number of suppliers being closely reviewed	supplier	Results (Teams, process, Customer ,leadership...)
213	All customers gets support for all the products and Services they got after buying	support	Results (Teams, process, Customer ,leadership...)
214	VTs get assessed to see if they completed their assigned tasks efficiently and effectively.	tasks	Results (Teams, process, Customer ,leadership...)
215	VO should assesses staff by monitoring electronic communications and systematically collecting data from peers and direct reports using 360 degree assessments.	team	Results (Teams, process, Customer ,leadership...)
216	VO result : maximizing the diversity of skills, optimizing the fit of individuals to teams, ensuring there are potential leaders in self-managed teams.	teams	Results (Teams, process, Customer ,leadership...)
217	Effectiveness could refer to whether the team has accomplished its assigned tasks	teams	Results (Teams, process, Customer ,leadership...)
218	Result : measure of Employee Satisfaction factors: reduced their role stressors ,happier with their supervisors , more committed to their organizations ,lower levels of satisfaction with peers ,lower levels of satisfaction with opportunities for promotion	teams	Results (Teams, process, Customer ,leadership...)
219	VT behavior measures : taking leadership roles during virtual team meetings, coaching new team members off-line, suggesting internal quality improvement strategies	teams	Results (Teams, process, Customer ,leadership...)
220	VO results: Value of the outcomes, Member satisfaction, External feedback		Results (Teams, process, Customer ,leadership...)
221	each VT member is Involve in all cross-boundary collaboration in the project.	access	Teams
222	Interests and actions of each employee should support the clearly stated and key goals of VO	action	Teams
223	Employee loyalty to VO's grand Goal.	adhere to goals	Teams
224	All VT members feel common purpose and common performance goals	coherence	Teams
225	Perception of cohesion (team belonging and feelings of morale) should be in VT members	cohesion	Teams
226	VT members have FTF meeting once in a while if not communicating through CMC typically improves the coordination	communication	Teams
227	Delay between response and feedback in a VT gives opportunity to think and reflect more	communication	Teams

228	Communication inside VT removes feelings of Isolation and Detachment	communication	Teams
229	Form fast communication: start using email and collaborative software systems ,videoconferencing ,make formal presentations through videoconferencing; preparing guidelines about when to see people face-to-face, when to send them email vs. voicemail messages, and when to avoid them altogether.	communication	Teams
230	in VTs Communication patterns are important	communication	Teams
231	in Vt all members should connect to each other with multiple medias	connection	Teams
232	VT head must develop a shared understanding and commitment to the team's purpose	connection	Teams
233	VT head will control members directly with procedures, reports and monitoring are present	control	Teams
234	Existing good consulting culture between team members.	culture	Teams
235	VT should have a unique culture because team members varied in their education, culture, language, time orientation and expertise.	culture	Teams
236	VT with international members a common language and culture fixed for communication	culture	Teams
237	In VT there is need for participatory type of culture	culture	Teams
238	VO culture designed in the way that these personal barriers dose not make any trouble :Gender, Age ,Discipline, Identity (who are we?), Ethnic background, Personal (differing tastes or preferences) , Native language, Preverbal (unable to articulate hunches),Theoretical framework Ethical ,Historical (differing experience with virtual teams) ,Individual (assumptions, values, biases, goals, styles, and so on)	culture	Teams
239	Decision ore being taking by democratic electronic methods	democratic	Teams
240	Documentation and reporting systems, including the electronic archive	documentation	Teams
241	VT members gives feedback to building trust and commitment	feedback	Teams
242	Creating a unite team spirit by broadcasting a member's performance online	feedback	Teams
243	VT members should develop a norm for providing feedback to each other about communication style, quantity, frequency, clarity, etc.	feedback	Teams
244	VT members provide Weaving (process of summarizing and synthesizing multiple responses) This tells people where they've been, where they are, and where they might want to go next	feedback	Teams
245	Staff can have formal communication trough channels to provide organizational areas with information about customers' needs	formal communication	Teams
246	Employees are allowed to decide how the work is done	free to innovate	Teams
247	VT gives a greater degree of freedom to individuals involved with the development project	freedom	Teams
248	VTs are cornerstone of progressive management for the foreseeable future	future	Teams
249	Team Selection is based on employees skills and professionalism	hire skilled staff	Teams
250	Selecting team members who are close to organization culture.	hiring skilled staff	Teams
251	Emphasis is placed on recruiting highly skilled employees	hiring skilled staff	Teams
252	VO can use the best talents in the world regardless of location	hiring skilled staff	Teams
253	VT have this ability to use the best talents available regardless of location	hiring skilled staff	Teams
254	Hiring in VO have a certain rules and procedures	hiring skilled staff	Teams
255	Staff Inventory levels is high	innovation	Teams
256	Existing an interactive relation between employee and leader of VO.	interactive relation	Teams
257	Employee opinions are taken into account when defining organizational objectives	involving	Teams
258	Employees are given the opportunity work as a team and suggest and implement solutions to work problems	involving and suggesting	Teams
259	VT meetings are kept small and informal, interactivity and sociability improve.	meetings	Teams
260	VT should have a culture of achieve self-generating commitment through motivation	motivation	Teams
261	VO members can change from project to project and even on the task basis.	move	Teams
262	Staff is considered an 'internal customer', who participates in policy, strategies and organizational structure.	participation	Teams
263	VT members :participation and involvement in decision making	participation	Teams
264	The hours of being online is not a base for employee salary	performance	Teams
265	Project planning including time lines and specified team member outcomes	PM	Teams
266	VT HR policies: reward/recognition systems, career development systems	policy	Teams

267	staff internalized the project management mindset to the point where it appears to be second nature to them and becomes a form of self-control	project management	Teams
268	Relationship building is so important in a VT and can strengthen feelings of inclusiveness or a sense of belonging	relation making	Teams
269	Employees are encouraged to meet customer's and the organization's objectives.	reward	Teams
270	The development of a fair and motivating reward system is important issue in a VT	reward	Teams
271	there is a well designed reward system structure in VT	reward	Teams
272	People are rewarded, recognized and cared for their achievements at work	reward system	Teams
273	Rewarding those behaviors that are required by the company's strategy: skill-based instead of job-based systems in order to encourage individuals to learn the necessary new skills, and pay-for-performance systems that focus more on collective than on individual performance in order to motivate and support cooperative behaviors.	reward system	Teams
274	VT head must do assignment of roles and responsibilities to members	roles	Teams
275	Agreement to team charters laying out general team norms and expectations	rules	Teams
276	Each member of the team being satisfied with their task and have respect to other's duty.	satisfaction	Teams
277	In a VT goals of the project need to be shared and embraced collectively due to multi-national and multicultural dimension of members.	sharing	Teams
278	VT staff have social process skills such as the ability to resolve conflict in project	skill	Teams
279	VT members need to have ability to access, analyze, and manage data.	skill	Teams
280	Each VT members should have Project management capabilities: planning and organizing individual work to correspond to team schedules; developing and using methods to report progress and problems; monitoring and controlling costs; taking actions to get back on track; documenting and sharing individual learning.	skill	Teams
281	each VT member should have ability to communicate across cultures: awareness of and sensitivity to cultural differences among team members; understanding how cultural perspectives influence work and collaboration; adjusting communication approach based on those differences, when appropriate.	skill	Teams
282	each VT member should have basic teamwork skills: managing differences; participating effectively in group problem-solving; cooperating with others; setting goals.	skill	Teams
283	each VT member should have Self-management skills: establishing personal and professional priorities and goals; prioritizing work and setting limits; creating and executing opportunities for individual learning and growth; taking the initiative to change working methods and processes to meet the demands of the work.	skill	Teams
284	VT Employee should be : technical knowledgeable , social adequacies , adaptable ,plan-ahead ,well organized ,flexible ,low levels of neuroticism ,resilient, extroverted, self-confident ,open to new experiences , highly self-motivated ,Establishing goals, developing plans to meet those ,goals, and executing plans, Multi-tasking ,influential ,strong sense of urgency and drive	skill	Teams
285	based on each position competences Staff get virtual training to update their skills	staff training	Teams
286	Virtual teams take on the same basic structure as "real" teams.	structure	Teams
287	In VO tasks are interdependent and team members share responsibility for outcomes	task	Teams
288	VT members working with a Matrix of projects with different Gunt chart	task	Teams
289	Form a fast VT relationship: self introduction, ask questions, find out their preference and interpersonal style.	team forming	Teams
290	Good ability of members to work as a team.	team working	Teams
291	Team members need special training and encouragement	training	Teams
292	VT members have good access to technical training. (continual and just-in-time learning).	training	Teams
293	VT members training : includes self managing skills, communication and meeting training, project management skills, technology training.	training	Teams
294	There must be enough IT framework training in VT	training	Teams
295	VT get language and intercultural communication training.	training	Teams
296	Training can balance Technical and Interpersonal Skills Among VT Members	training	Teams
297	Existing of a stable trust between employees	Trust	Teams
298	Develop trust between VT with Cultural and functional diversity is challenging	trust	Teams
299	in VT a "high trust" culture; teamwork and collaboration are the norm.	trust	Teams

300	Building and developing Trust and comfort level in VTs are difficult because of the high turnover of project leaders, project managers and members.	Trust	Teams
301	Trust in a VO is : Internalization of organizational norms and practices ,Desire to remain with the organization ,Willingness to cooperate with others ,Willingness to share knowledge	Trust	Teams
302	all the meetings are virtual and face to face meeting are rarely happening	Virtuality	Teams

Appendix E: AMOS statistical analysis report

Regression Weights of conceptual model

Relation			Estimate	S.E.	C.R.	Standardized Regression Weights	P
E1	<---		1.000			.713	
E2	<---		.518	.071	7.286	.420	***
E3	<---		.753	.077	9.726	.564	***
E4	<---		.598	.074	8.110	.469	***
E5	<---	E	.617	.077	8.010	.463	***
E6	<---		.607	.069	8.744	.506	***
E7	<---		.736	.077	9.535	.553	***
E8	<---		.790	.082	9.666	.561	***
E9	<---		.678	.068	10.019	.582	***
L1	<---		1.000			.381	
L2	<---		.822	.196	4.187	.281	***
L3	<---		2.122	.339	6.262	.588	***
L4	<---		1.259	.221	5.690	.469	***
L5	<---	L	1.047	.198	5.284	.406	***
L6	<---		1.426	.231	6.179	.568	***
L7	<---		1.493	.243	6.139	.558	***
L8	<---		.740	.176	4.202	.283	***
L9	<---		1.014	.192	5.290	.406	***
K1	<---		1.000			.309	
K2	<---		1.939	.402	4.820	.529	***
K3	<---	K	1.478	.298	4.962	.590	***
K4	<---		1.562	.333	4.689	.484	***
K5	<---		1.581	.325	4.864	.546	***
K6	<---		1.880	.390	4.819	.529	***
T1	<---		1.000			.696	
T2	<---		.484	.067	7.179	.416	***
T3	<---		.645	.083	7.753	.450	***
T4	<---		.973	.085	11.414	.677	***
T5	<---	T	.806	.078	10.307	.607	***
T6	<---		.674	.094	7.176	.416	***
T7	<---		.743	.066	11.270	.668	***
T8	<---		.865	.081	10.692	.631	***
T9	<---		1.057	.090	11.739	.699	***
I8	<---		1.000			.528	
I7	<---		.869	.116	7.513	.505	***
I6	<---		.929	.120	7.765	.529	***
I5	<---		.854	.110	7.754	.528	***
I4	<---	I	.839	.110	7.643	.517	***
I3	<---		1.052	.129	8.165	.570	***
I2	<---		.906	.127	7.144	.471	***
I1	<---		.638	.107	5.966	.373	***
I9	<---		1.305	.144	9.079	.679	***
P1	<---		1.000			.371	
P2	<---		1.152	.210	5.479	.475	***
P3	<---	P	1.005	.195	5.150	.418	***
P4	<---		1.249	.222	5.625	.505	***
P5	<---		1.323	.227	5.822	.550	***
P6	<---		1.109	.214	5.188	.424	***

Relation			Estimate	S.E.	C.R.	Standardized Regression Weights	P
P7	<---		1.651	.265	6.235	.679	***
P8	<---		1.574	.270	5.832	.553	***
R9	<---		1.000			.419	
R8	<---		1.317	.220	5.992	.516	***
R7	<---		1.396	.224	6.228	.562	***
R6	<---		1.393	.227	6.134	.543	***
R5	<---	R	1.179	.196	6.012	.520	***
R4	<---		.955	.180	5.322	.414	***
R3	<---		1.306	.214	6.107	.538	***
R2	<---		1.177	.220	5.343	.417	***
R1	<---		1.796	.292	6.147	.546	***

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
L	<-->	K	.247	.062	3.963	***
L	<-->	I	.485	.092	5.273	***
L	<-->	T	.601	.105	5.729	***
E	<-->	L	.540	.097	5.591	***
E	<-->	T	.819	.117	7.022	***
E	<-->	I	1.034	.140	7.367	***
E	<-->	K	.485	.105	4.629	***
T	<-->	p	.477	.091	5.220	***
E	<-->	p	.569	.104	5.466	***
L	<-->	p	.332	.073	4.564	***
I	<-->	R	.385	.076	5.071	***
E	<-->	R	.438	.082	5.354	***
L	<-->	R	.224	.051	4.370	***
K	<-->	R	.175	.047	3.709	***
K	<-->	I	.490	.108	4.524	***
T	<-->	R	.401	.077	5.186	***
p	<-->	R	.217	.051	4.238	***
K	<-->	p	.240	.062	3.874	***
I	<-->	p	.485	.095	5.110	***
K	<-->	T	.369	.085	4.336	***
T	<-->	I	.745	.115	6.502	***

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	139	7188.576	1631	.000	4.407
Saturated model	1770	.000	0		
Independence model	59	11640.048	1711	.000	6.803

Model	RMR	GFI	AGFI	PGFI
Default model	.259	.573	.537	.528
Saturated model	.000	1.000		
Independence model	.611	.254	.228	.246

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.382	.352	.445	.413	.440
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Model	PRATIO	PNFI	PCFI
Default model	.953	.365	.420
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

Model	NCP	LO 90	HI 90
Default model	5557.576	5298.359	5823.582
Saturated model	.000	.000	.000
Independence model	9929.048	9590.729	10273.976

Model	FMIN	F0	LO 90	HI 90
Default model	20.480	15.834	15.095	16.591
Saturated model	.000	.000	.000	.000
Independence model	33.163	28.288	27.324	29.271

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.099	.096	.101	.000
Independence model	.129	.126	.131	.000

Model	AIC	BCC	BIC	CAIC
Default model	7466.576	7523.895	8003.620	8142.620
Saturated model	3540.000	4269.897	10378.627	12148.627
Independence model	11758.048	11782.378	11986.002	12045.002

Model	ECVI	LO 90	HI 90	MECVI
Default model	21.272	20.534	22.030	21.436
Saturated model	10.085	10.085	10.085	12.165
Independence model	33.499	32.535	34.481	33.568

Model	HOELTER .05	HOELTER .01
Default model	85	87
Independence model	55	56

Appendix F: National Quality / Business Excellence Awards in different countries

Research undertaken on behalf of NIST by Musli Mohammad (m.mohammad@massey.ac.nz) and Dr Robin Mann (r.s.mann@massey.ac.nz) Centre for Organisational Excellence Research, www.coer.org.nz. (Last updated: 20 August 2010)

Region	Sub-region	Country	No	Name of award	Model used	Administrative organisations(s)	Website
AFRICA	Eastern Africa	Mauritius	1	Mauritian National Quality Award	National model (developed from Baldrige)	Mauritius Export Processing Zone Association	http://www.asq.org/qic/display-tem/index.pl?item=10615i
AFRICA	Northern Africa	Egypt	2	The National Award for Excellence in Quality	National model (developed from Baldrige)	Industrial Modernisation Centre (IMC)	http://www.nationalawards-eg.com/
AFRICA	Northern Africa	Morocco	3	Moroccan National Quality Award	National model (developed from EFQM Excellence Model)	Moroccan Association for Quality	http://www.atento.com/content/national_ quality_award_en.mmp
AFRICA	Southern Africa	South Africa	4	South African Excellence Award	National model (developed from EFQM Excellence Model)	South African Business Excellence Foundation	http://www.asip.org.ar/en/revistas/39/kapp/kapp_01.php
ASIA	Eastern Asia	China	5	China Quality Award	National model (developed from Baldrige)	China Association for Quality	http://www.caq.org.cn/htm/english/Activities.asp#
ASIA	Eastern Asia	Hong Kong SAR	6	Hong Kong Management Association Quality Award	Baldrige Criteria for Performance Excellence	Hong Kong Management Association (HKMA)	http://www.hkma.org.hk/qa/front.htm
ASIA	Eastern Asia	Japan	7	Japan Quality Award	National model (developed from Baldrige)	Japan Productivity Center	http://www.jqac.com/website.nsf/NewMainPageE?OpenPage
ASIA	Eastern Asia	Japan	8	Deming Prize	National model (unique)	Japanese Union of Scientists and Engineers (JUSE)	http://www.juse.or.jp/e/deming/
ASIA	Eastern Asia	Mongolia	9	National Productivity Award (NPA)	National model (developed from Baldrige)	National Productivity and Development Center	http://www.npdc.org.mn/
ASIA	Eastern Asia	Korea	10	Korean Quality Grand Award	National model (unique)	Korean Standards Association (KSA)	http://www.ksa.or.kr/eng/html/promotion.html
ASIA	Eastern Asia	Taiwan	11	Taiwan National Quality Award	National model (unique)	Ministry of Economics Affairs	http://w1.csd.org.tw/english/Quality.htm
ASIA	South-central Asia	India	12	Rajiv Gandhi National Quality Award	National model (unique)	Bureau of Indian Standards	http://www.bis.org.in/other/rgnqa_geninfo.htm
ASIA	South-central Asia	India	13	CII-EXIM Bank Award for Business Excellence	EFQM Excellence Model	Confederation of Indian Industry and Export-Import (EXIM) Bank of India	http://www.cii-iq.in/CII-Exim%20Bank%20Award%20for%20Excellence.htm
ASIA	South-central Asia	India	14	IMC Ramkrishna Bajaj National Quality Award	National model (developed from Baldrige)	IMC Ramkrishna Bajaj National Quality Awards Committee	http://www.imcrbnqa.com/
ASIA	South-central Asia	India	15	Golden Peacock National Quality Award	National model (developed from Baldrige and EFQM Excellence Model)	Institute of Directors	http://www.goldenpeacockawards.com/index.php?option=com_content&view=article&id=103&Itemid=71
ASIA	South-central Asia	Iran	16	Iran National Quality Award (INQA)	National model (developed from EFQM Excellence Model)	Institute of Standards and Industrial Research of Iran	http://www.meccaward.com/22/section.aspx/download/32
ASIA	South-central Asia	Nepal	17	FNCCI National Business Excellence Award	National model (developed from Baldrige and Deming Prize)	Federation of Nepalese Chambers of Commerce & Industry (FNCCI)	http://www.npedc-nepal.org
ASIA	South-central Asia	Pakistan	18	Pakistan National Quality Award	National model (developed from Baldrige and Deming Prize)	National Productivity Organization (NPO)	http://www.npo.gov.pk/pap/index.html
ASIA	South-central Asia	Sri Lanka	19	Sri Lanka National Quality Award	Baldrige Criteria for Performance Excellence	Sri Lanka Standards Institution (SLSI)	http://www.slsi.lk/national-quality-awards.php#qawardcriteria
ASIA	South-eastern Asia	Brunei Darussalam	20	Brunei Civil Service Excellence Award	Not known	Brunei Darussalam's Civil Service	Not known
ASIA	South-eastern Asia	Indonesia	21	Indonesian Quality Award	Baldrige Criteria for Performance Excellence	Indonesian Quality Award Foundation (IQAF)	http://www.indonesianqualityaward.org/
				Prime Minister's Industry			

ASIA	South-eastern Asia	Malaysia	22	Excellence Award (formerly known as Prime Minister's Quality Award for Private Sector)	National model (developed from Baldrige and Deming Prize)	Ministry of International Trade and Industry (MITI)	http://www.miti.gov.my/
ASIA	South-eastern Asia	Malaysia	23	Prime Minister's Quality Award (for public sector)	National model (unique)	Malaysian Administrative and Modernization Planning Unit (MAMPU)	http://www.mampu.gov.my/pdf/akpm2009.pdf
ASIA	South-eastern Asia	Malaysia	24	Quality Management Excellence Award (QMEA)	National model (developed from Baldrige and Deming Prize)	Malaysia Productivity Corporation (MPC)	http://www.mpc.gov.my
ASIA	South-eastern Asia	Philippines	25	Philippines Quality Award (PQA)	Baldrige Criteria for Performance Excellence	Department of Trade and Industry (DTI) and Development Academy of the Philippines	http://www.pqa.org.ph/pqaaward.htm
ASIA	South-eastern Asia	Singapore	26	Singapore Quality Award	National model (developed from Baldrige and EFQM Excellence Model)	The Standards, Productivity and Innovation Board (SPRING)	http://www.spring.gov.sg
ASIA	South-eastern Asia	Thailand	27	Thailand Quality Award (TQA)	Baldrige Criteria for Performance Excellence	Foundation for Thailand Productivity Institute (FTPI)	http://www.tqa.or.th/en/node/743
ASIA	South-eastern Asia	Vietnam	28	Vietnam Quality Award	National model (developed from Baldrige)	Directorate for Standards, Metrology and Quality (STAMEQ)	http://en.tcvn.vn/default.asp?action=article&ID=2648
ASIA	Western Asia	Bahrain	29	No award to date	EFQM Excellence Model	Bahrain Centre for Excellence	http://bahrainexcellence.org
ASIA	Western Asia	Cyprus	30	ECO-Q Recognitions	National model (unique)	ECO-Q Magazine	Not known
ASIA	Western Asia	Israel	31	Israel National Industrial Quality Award	National model (unique)	The Israek Standards Institute	http://www.sii.org.il/
ASIA	Western Asia	Jordan	32	King Abdullah II Award for Excellence	National model (developed from EFQM Excellence Model)	King Abdullah II Center for Excellence	http://www.kace.jo/Default.shtm
ASIA	Western Asia	Lebanon	33	Lebanese Excellence Award	EFQM Excellence Model	Ministry of Economy & Trade	http://www.qualeb.org
ASIA	Western Asia	Oman	34	Oman Award for Excellence	Not known	Not known	Not known
ASIA	Western Asia	Qatar	35	Qatar Quality Award	Not known	Not known	Not known
ASIA	Western Asia	Saudi Arabia	36	King Abdulaziz Quality Award	Not known	Saudi Arabian Standards, Metrology and Quality Organization (SASO)	http://www.kaqa.org.sa/index_en.aspx
ASIA	Western Asia	Turkey	37	TUSIAD-KalDer Quality Award	EFQM Excellence Model	KalDer and TÜSİAD	http://www.kalder.org.tr/page.asp?PageID=592
ASIA	Western Asia	United Arab Emirates	38	Dubai Quality Awards	EFQM Excellence Model	Department of Economic Development	http://www.dqa.ae/DQA
ASIA	Western Asia	United Arab Emirates	39	Sheikh Khalifa Excellence Award	EFQM Excellence Model	Abu Dhabi Chamber Of Commerce & Industry	http://www.adcci.gov.ae:90/public/skea/index_e.htm
EUROPE	Eastern Europe	Czech Republic	40	Quality Award of the Czech Republic	EFQM Excellence Model	Czech Quality Award Association (CQAA)	Not known
EUROPE	Eastern Europe	Hungary	41	Hungarian National Quality Award	EFQM Excellence Model	The Hungarian Quality Development Center (HQDCIT)	http://www.nfgm.gov.hu/en/print/archiv_en/tradeindustry/national_quality_award.html

EUROPE	Eastern Europe	Hungary	42	IIASA SHIBA Award	National model (developed from Deming Prize)	The Hungarian Quality Development Center & National Institute IIASA	http://www.nfgm.gov.hu/en/archiv_en/tradeindustry/iiasa_shiba_award.html?query=id%C3%A9n
EUROPE	Eastern Europe	Poland	43	Polish Quality Award	EFQM Excellence Model	Polish Chamber of Commerce	http://www.chamberofcommerce.pl/
EUROPE	Eastern Europe	Poland	44	Business Fair Play Award	EFQM Excellence Model	Polish Chamber of Commerce	http://www.chamberofcommerce.pl/
EUROPE	Eastern Europe	Romania	45	Romanian Quality Award	EFQM Excellence Model	Not known	Not known
EUROPE	Eastern Europe	Russian Federation	46	Russian National Quality Award	EFQM Excellence Model	Government of the Russian Federation	Not known
EUROPE	Eastern Europe	Slovakia	47	The Slovak Quality Award	National model (developed from EFQM Excellence Model)	Slovak Society for Quality	Not known
EUROPE	Eastern Europe	Ukraine	48	Ukrainian National Quality Award	EFQM Excellence Model	Ukrainian Association for Quality	http://uaq.org.ua/
EUROPE	Northern Europe	Denmark	49	Danish Quality Prize (Danske Kvalitetspris)	EFQM Excellence Model	Center for Ledelse	http://english.cfl.dk/
EUROPE	Northern Europe	Estonia	50	Estonian Quality Award	EFQM Excellence Model	Estonian Centre for Excellence (ECE)	http://ww2.eas.ee/?id=1412
EUROPE	Northern Europe	Finland	51	Finnish Quality Award (Suomen laatupalkinto)	EFQM Excellence Model	Finnish Center for Excellence	Not known
EUROPE	Northern Europe	Iceland	52	Icelandic Quality Award	National model (developed from Baldrige and EFQM Excellence Model)	Icelandic Association for Quality	Not known
EUROPE	Northern Europe	Ireland	53	Irish Business Excellence Award	EFQM Excellence Model	Excellence Ireland Quality Association (EIQA)	http://www.eiqa.com/
EUROPE	Northern Europe	Ireland	54	Q-MARK National Quality Award	National model (developed from Baldrige)	Excellence Ireland Quality Association (EIQA)	http://www.eiqa.com/
EUROPE	Northern Europe	Latvia	55	Latvian National Quality Award	EFQM Excellence Model	Ministry of Economy & Latvian Quality Association	http://www.lka.lv/?module=Articles&view=list&lng=en
EUROPE	Northern Europe	Lithuania	56	Lithuanian National Quality Prize	EFQM Excellence Model	Minister of Economy & Quality Council	Not known
EUROPE	Northern Europe	Norway	57	Norwegian Quality Award	National model (developed from EFQM Excellence Model)	Excellence Norway Forum for Leadership and Quality	Not known
EUROPE	Northern Europe	Northern Ireland	58	Northern Ireland Quality Award	EFQM Excellence Model	Centre for Competitiveness	http://www.cforc.org/
EUROPE	Northern Europe	Scotland	59	Scottish Award for Business Excellence	EFQM Excellence Model	Quality Scotland	http://www.qualityscotland.co.uk/home.asp
EUROPE	Northern Europe	Sweden	60	Swedish Quality Award (Utmarkelsen Svensk Kvalitet)	Baldrige Criteria for Performance Excellence	Swedish Institute for Quality (SIQ)	http://www.siq.se/Home.htm
EUROPE	Northern Europe	Sweden	61	Swedish Quality Award (Utmarkelsen Svensk Kvalitet)	EFQM Excellence Model	Swedish Institute for Quality (SIQ)	http://www.siq.se/Home.htm
				Swedish Quality			http://www.siq.se/Home.htm

EUROPE	Northern Europe	Sweden	62	Award (Utmarkelsen Svensk Kvalitet)	National model (unique)	Swedish Institute for Quality (SIQ)	
EUROPE	Northern Europe	United Kingdom	63	UK Business Excellence Award	EFQM Excellence Model	British Quality Foundation (BQF)	http://www.bqf.org.uk/
EUROPE	Northern Europe	Wales	64	Wales Quality Award	EFQM Excellence Model	Wales Quality Centre	http://www.walesqualitycentre.org.uk/
EUROPE	Southern Europe	Croatia	65	Croatian Quality Award	Not known	Not known	Not known
EUROPE	Southern Europe	Greece	66	Athens Chamber of Commerce and Industry Awards	National model (developed from EFQM Excellence Model)	Athens Chamber of Commerce and Industry	http://www.acci.gr/acci/Home/tabid/28/language/el-GR/Default.aspx
EUROPE	Southern Europe	Greece	67	ECO-Q Recognitions	National model (unique)	ECO-Q Magazine	Not known
EUROPE	Southern Europe	Italy	68	Italian Quality Award (Premio Qualita Italia)	EFQM Excellence Model	Associazione Premio Qualita Italia (APQI)	http://www.apqi.it/index.php?page=/main/home
EUROPE	Southern Europe	Malta	69	Malta Quality Award	Not known	Not known	Not known
EUROPE	Southern Europe	Portugal	70	Portuguese Quality Award (Premio de Excellencia – Systema Portugues da Qualidade)	EFQM Excellence Model	Instituto Portugues de Qualidade	http://www.ipq.pt/custompage.aspx
EUROPE	Southern Europe	Slovenia	71	Slovenian Business Excellence Prize	EFQM Excellence Model	Metrology Institute of the Republic of Slovenia (MIRS)	http://www.mirs.gov.si/en/field_of_activity/slovenian_business_excellence_prize/
EUROPE	Southern Europe	Spain	72	Prince Philip Award for Business Excellence (Premios Principe Felipe a la Excellencia Empresarial)	National model (unique)	Spanish Ministry of Industry, Tourism and Trade	http://www.premiosprincipefelipe.es/
EUROPE	Western Europe	Austria	73	Austrian Quality Award	EFQM Excellence Model	Austrian Foundation for Quality Management (AFQM)	http://www.qualityaustria.com/index.php?id=539&L=1
EUROPE	Western Europe	Belgium	74	K2 Award	EFQM Excellence Model	Flemish Centre for Quality Management (VCK)	http://www.vck.be/
EUROPE	Western Europe	France	75	French Quality Award (Prix Francais pour la Qualite)	National model (developed from EFQM Excellence Model)	Mouvement Francais pour la Qualite (MFQ)	http://www.mfq-fc.asso.fr/
EUROPE	Western Europe	Germany	76	German National Quality Award (Ludwig-Erhard-Preis)	EFQM Excellence Model	German Society for Quality (DGQ)	http://www.dgq.de/en/welcome.htm
EUROPE	Western Europe	Luxembourg	77	Prix Luxembourgeois de la Qualite	National model (unique)	Mouvement Luxembourgeois pour la Qualite, Minister of Economy & Centre of Public Research	Not known
EUROPE	Western Europe	Netherlands	78	Dutch Quality Award	National model (developed from EFQM Excellence Model)	Institute Nederland Kwaliteit (INK)	Not known

EUROPE	Western Europe	Switzerland	79	Swiss Quality Award for Business Excellence	EFQM Excellence Model	ESPRIX	http://www.esprix.ch/de/business/business_excellence.php
LATIN AMERICA	Caribbean	Aruba	80	Aruba Quality Award	National model (developed from Baldrige)	Aruba Quality Foundation	Not known
LATIN AMERICA	Caribbean	Cuba	81	National Quality Award of Cuban Republic	National model (unique)	Ministry of Economy and Planning	Not known
LATIN AMERICA	Caribbean	Puerto Rico	82	The Puerto Rico Excellence Award	Not known	Not known	Not known
LATIN AMERICA	Central America	Costa Rica	83	Costa Rica Excellence Award	National model (unique)	Costa Rican Chamber of Industries	Not known
LATIN AMERICA	Central America	Mexico	84	National Quality Award of Mexico (Premio Nacional de Calidad)	National model (unique)	Mexican Foundation for Total Quality (FUNDAMECA)	http://www.fundameca.org.mx/
LATIN AMERICA	South America	Argentina	85	National Quality Award of Argentina (Premio Nacional a la Calidad)	National model (developed from Baldrige, Deming Prize and EFQM Excellence Model)	Foundation for the National Quality Award (FNQA)	http://www.premiocalidad.org.ar/index_2.html
LATIN AMERICA	South America	Brazil	86	Brazil National Quality Award	National model (developed from Baldrige and EFQM Excellence Model)	Brazilian Foundation for the National Quality Award	Not known
LATIN AMERICA	South America	Chile	87	National Quality Award of Chile (Premio Nacional a la Calidad)	National model (developed from Baldrige, Deming Prize and EFQM Excellence Model)	National Center of Productivity and Quality	www.chilecalidad.cl
LATIN AMERICA	South America	Colombia	88	Colombia National Quality Prize	National model (unique)	National Government of Columbia	Not known
LATIN AMERICA	South America	Ecuador	89	Ecuador National Quality Award	Not known	Not known	Not known
LATIN AMERICA	South America	Paraguay	90	Paraguay National Quality Award	Not known	Not known	Not known
LATIN AMERICA	South America	Peru	91	Peruvian National Quality Award	Not known	Not known	Not known
LATIN AMERICA	South America	Uruguay	92	National Quality Award of Uruguay (Premio Nacional de Calidad)	National model (unique)	National Quality Committee of Uruguay	Not known
NORTHERN AMERICA	Northern America	Canada	93	Canada Awards for Excellence	National model (unique)	National Quality Institute of Canada	http://www.nqi.ca/Awards/Overview.aspx
NORTHERN AMERICA	Northern America	United States of America	94	Malcolm Baldrige National Quality Award (MBNQA)	Baldrige Criteria for Performance Excellence	Baldrige National Quality Program, National Institute of Standards and Technology (NIST)	http://baldrige.nist.gov/
OCEANIA	Australia and New Zealand	Australia	95	Australian Business Excellence Award	National model (unique)	SAI Global	http://www.saiglobal.com/business-improvement/process/framew

							ork/awards.htm
OCEANIA	Australia and New Zealand	New Zealand	96	New Zealand Business Excellence Award	Baldrige Criteria for Performance Excellence	New Zealand Business Excellence Foundation	http://www.nzbef.org.nz/
OCEANIA	Melanesia	Fiji	97	Fiji Business Excellence Award	National model (developed from Australian Business Excellence Framework)	Training and Productivity Authority of Fiji	http://productivitypromotion.tejoswebhost.com/index.php?option=com_content&task=view&id=22&Itemid=40

Appendix G: Evidence from Extensive Literature Review

G-1. Evidence from Extensive Literature Review:

V-leadership, personal characteristic, attitude : *Durai (2002); Lurey and Raisinghani (2001); Das gupta (2011); Lipnack & Stamps (1997); O'Hara-Devereaux ,Johanson (1994); Kramer (2005); Shachaf (2005); Oertig, Buergi (2006); Duarte , Snyder (1995); Oakley (1998); Switzer (2000).*

V leadership, task- technology fit : *Miles, Snow , Miles (2000); Redoli, et al. (2008); Avolio, Kahai, Dodge (2000); Zigurs (2003); Watson-Manheim, Chudoba, Crowston (2002); Jarvenpaa, Leidner (1999); Massey, Hung, Montoya-Weiss, Ramesh (2001); Jarvenpaa, Leidner (1999); Chidambaram, Kautz (1993); Anderson (2000); Becker, Steele (1995); Davenport & Pearlson (1998); Durmusoglu ,Calantone (2006); Ozer M (2004); Taifi (2007); Zhouying (2005); Nadler , Gerstein (1992); Ale Ebrahim, Ahmed, Taha (2009) ; Strader et al. (1998).*

V leadership, Relation with team : *Tong, Yang (2013); Lurey, Raisinghani (2001); Yu Tong et al. (2013); Duarte, Tennant-Snyder (1999); kayworth, leidner (2001); Pauleen (2003); Kramer (2005); Kelly, Davis, Nelson, Mendoza (2008); Misiolek, Heckman (2005); Cassell, Huffaker, Tversky, Ferriman (2006); Sarker, Grewel, Sarker (2002); Oertig, Buergi (2006); Duarte, Snyder (1995); Hara, Bonk, Angeli (2000); Kayworth, Leidner's study (2001) ; Jarvenpaa, shaw (1998); Kitchen, McDougall (1999); Lipnack, Stamps (2000); Robey et al. (2000); Cordery at al. (2009); Hron et al. (2000); Warkentin et al. (1999); Hunsaker and Hunsaker (2008); Meyerson et al,(1996); Walvoord et al. (2008).*

V leadership, VO structure design: *Lurey, Raisinghani (2001); Kramer (2005); Shachaf (2005); Oertig, Buerg, (2006); McKinlay (2005); Crandall, Wallace (1998); Jackson (1999); Jackson, Gharavi, Klobas (2006); Depickere (1999); Cordery at al. (2009); Hunsaker, Hunsaker (2008); Davenport, Parson (1998); Majchrzak et al. (2000 b); Johnson, Suriya, Won Yoon, Barrett, La Fluer (2002); Jarvenpaa, Leidner (1999); Daily, Whatley, Ash, Steiner (1996); Dennis & Valacich (1993); Ngwenyama, Lyytinen (1997); Strader et al. (1998).*

V leadership, Performance milestone: *Lurey, Raisinghani (2001); Oertig, Buergi (2006) ; Kayworth, Leidner (2001); Thompson (1989); Adami (1999); Depickere (1999); Cordery at al. (2009); Bell, Kozlowski (2002); Lee (2002).*

V leadership, team selection : *Lepak D, Snell SA (1998) ; Lurey, Raisinghani (2001); Yu Tong et al. (2013); Shachaf (2005); Saleem, Krznari, Newhouse, Darlington (2003); Oertig, Buergi (2006); Depickere (1999) ;Cordery at al. (2009); Bell and Kozlowski (2002); Grabowski M, Ayyalasomayajula P, Merrick J, Harrald JR, Roberts K (2007); Godar SH, Pixy Ferris S (2004).*

V leadership, Role clarity, shared purpose, project and team management: *Pawar, Sharifi (1997); Tong, Yang (2013); Duarte ,Snyder (1995); Ale Ebrahim, et al. (2011); Lurey, Raisinghani (2001); Hertel, Geister, Konradt (2005); Yu Tong et al. (2013); Kramer (2005); Shachaf (2005); Oertig, Buergi (2006); Duarte, Snyder (1995); Shamir (1999); Den Hartog (2004); Shamir (1999); Barker (1993); Bradford, Cohen (1987); Huey (1994); Ghiselin (1994); Thompson (1989); Adami (1999); Davenport (2005); Drucker (1999); Jarvenpaa ,shaw (1998); Kitchen, McDougall (1999); Lipnack, Stamps (2000); Robey et al. (2000); Warkentin et al. (1999); Majchrzak et al. (2000b); Johnson, Suriya, Won Yoon, Barrett ,La Fluer (2002).*

G-2. Evidence from Extensive Literature Review:

Culture, Virtual teams: *Martinez-Sanchez et al. (2006); Kankanhalli, Tan , Wei (2006) ; Poehler, Schumacher (2007); Paul et al (2005); Chudoba, et al. (2005); Staples, Zhao (2006); Pawar, Sharifi (1997) ; Erickson (2000); Suomi, Pekkola (1999); Ogbor (2000) ; Kramer (2005); Jackson, Gharavi , Klobas (2006); Zhouying (2005); Powell, Piccoli & Ives (2004); Furst, Blackburn, Rosen (1999).*

Cohesion, integrity, VT membership, team formation & structure: *Cascio (2000); Kratzer, Leenders (2005); Gaudes, et al. (2007) ;Ale Ebrahim, Ahmed, Taha (2009); Leenders, Engelen, Kratzer (2003); Powell, Piccoli, Ives (2004); Gajendran, Harrison (2007); May, Carter (2001); Bal , Teo (2001); Gassmann ,Von Zedtwitz (2003); Shin (2005); Hertel, Geister, Konradt (2005); Rezgui (2007); Bal , Teo (2001); Paul et al. (2005); Wong ,Burton (2000); Cascio ,Shurygailo (2003); Leenders, Engelen, Kratzer (2003); Hunsaker ,Hunsaker (2008); Martinez, Fouletier, park (2001); Tong, Yang (2013) ; Joinson (2002); Massey, Montoya-Weiss, Song (2001).*

Communication, relationship building: *Gassmann, Von Zedtwitz (2003); Hertel, Geister, Konradt (2005); Cascio, Shurygailo (2003); Peters, Manz (2007); Vakola, Wilson (2004); Lee-Kelley, Sankey (2008); Wong, Burton (2000); Dafoulas, Macaulay (2002); Peters, Manz (2007); Gassmann, Von Zedtwitz (2003); Rezgui (2007); Precup et al. (2006); Bordia (1997); Lipnack, Stamps (2000) ; Massey, Montoya-Weiss , Hung (2002); Lu, Watson-Manheim, Chudoba, Wynn (2006); Park, Hwang (2003); Cascio, Shurygailo (2003); Cummings (2004) ; Hossain, Wigand (2004); Gibson , Cohen (2006).*

Reward system, Virtual teams : *Hambrick, Davison, Snell , Snow (1998) ; Ryssen , Godar (2000) ; Hertel, Geister , Konradt (2005); Bal, Teo (2001); Lurey , Raisinghani (2001); Bal J , Gundry J (1999).*

Team knowledge, Virtual team member's personal skills : *Bal , Teo (2001) ;Kirkman et al. (2004) ; Eppinger, Chitkara (2006); Martins, Gilson ,Maynard (2004); Rice et al. (2007); Johnson, Heimann, O'Neill (2001) ; Joinson (2002); Gould, D. (1997).*

Trust, Internalize organizational norms, Desire to remain in company, willing to cooperate, Willingness to share knowledge: *Chen TY, Chen YM, Chu HC (2008); Handy (1995); Hackman, Oldham (1980); Jarvenpaa, Shaw (1998); Ale Ebrahim, et al. (2011). Kankanhalli, Costa (2003); Erdem, Ozen (2003); Tan, Wei (2006) ; Poehler, Schumacher (2007); Paul, et al (2005); Gould D (1997); Ale Ebrahim, Ahmed, Taha (2009); WI et al. (2008); Politis (2003); Chou YM, Collins N (2012) ; Cao et al. (2006); Webster J , Wong W.K.P. (2008) ; Mun J, Shin M , Jung M (2011); Rico R, Alcover CM, Sánchez-Manzanares M, Gi F (2009); Yasir M, Abdullah MT, Majid M (2010).*

G-3. Evidence from Extensive Literature Review:

Knowledge documentation, Knowledge sharing: *Malhotra (2000); shekhar (2006); Rosen, Furst, Blackburn (2007); Durai (2002); Staples ,Webster (2008); Venkatraman, Henderson (1998); Kaboli A, Tabari M, Kaboli E (2006); Cooney (2004); Ebrahim, Ahmed, Taha (2009); Tong ,Yang (2013); Rosen, Furst ,Blackburn (2007); Zakaria, Amelinckx ,Wilemon (2004); Martins, Gilson, Maynard (2004); WI et al.(2008).*

VO Knowledge, knowledge purpose, Improvement : *Das gupta (2011); Oertig, Buergi (2006); Shamir (1999); Den Hartog (2004); Davenport (2005); McKinlay (2005); Cordery et al. (2009) ; Hanson (2007) ; Shachaf, Hara (2005); Quintas et al (1997); Gupta et al (2000); Denison , Mishra (1995) ; Malhotra (1997); Lin FR, Lin SC, Tzu-ping H (2008); Vinaja R (2003); Sole D , Edmondson A (2002); Rae L (1998); Griffith TL , Neale MA (2001).*

G-4. Evidence from Extensive Literature Review:

ICT framework, data server, cloud computing: *Mell (2009); Yates, Orlikowski, Woerner (2003); SUN (2001); Magiera, Pawla (2005).*

ICT framework, virtual working, task thechnology fit ICT framework : *Ale Ebrahim, Ahmed, Abdul Rashid, Taha (2011); Ale Ebrahim, Ahmed , Taha (2009); Duarte, tenant-Snyder (1999); Zigurs (2003); Mortensen, Caya & Pinsonneault (2009); Staples, Webster (2007); Lu, Watson-Manheim, Chudoba ,Wynn(2006); Qureshi, Vogel(2001); Ocker, Fjermestad(2008); Joinson (2002); Bell, Kozlowski (2002); Strader et al.(1998).*

ICT framework, physical location, sending messages: *Yates, Orlikowski, Woerner (2003); Ale Ebrahim N, Ahmed S, Abdul Rashid SH, Taha Z (2011); Gould (1997); Rezgui (2007);* Davenport, Pearlson (1998).

ICT framework, remote access: *Thissen, et al., (2007); Scott, Snell (1998); Ale Ebrahim, Ahmed, Taha (2009); SUN (2001); Ale Ebrahim, Ahmed, Abdul Rashid, Taha (2011).*

Video conferencing, ICT framework : *Townsend, DeMarie, Hendrickson (1998); Ale Ebrahim, Ahmed, Abdul Rashid, Taha (2011); Ale Ebrahim et al. (2009); Erastos Filos (2006); Shirley Gregor, Arjen Wassenaar, Stewart Marshall (2002); Stohr et al. (2000); Lin, Standing, Liu (2008); Gould (1997); Stough, Stanley ,Eom, Sean, Buckenmyer, James (2000); May ,Carter (2001); Bergiel, Bergiel, Balsmeier (2008); Mohammad K (2009).*

G-5.Evidence from Extensive Literature Review:

Process design, knowledge sharing process, process development: *Priego-Roche LM, Thom LH, Front A, Rieu D, Mendling J (2012); Bal , Gundry (1999); Rosen, Furst, Blackburn (2007); Sarker et al. (2001); Suchan, Hayzak (2001); Shekhar (2006); Travica (2005); Venkatraman N, Henderson J (1998); Kaboli et al. (2006), Kraut et al. (1998); Upton, McAfee (1996); Venkatraman, Henderson (1998); May ,Carter (2001); Martinez, Fouletier, park (2001); Park, Hwang (2003); Duarte , Snyder (1995); Lurey, Raisinghani (2001); Chudoba, et al. (2005); Gould D. (1997); Gibson, Cohen's (2006); Hackman, Oldham (1980); ; Kirkman, et al. (2002); Tong, Yang (2013); Oertig M, Buergi T (2006); Sawyer, Guinan (1998); Janz, Wetherbe, Davis, Noe (1997); Zaccaro, Bader (2003); Saleem, Krznari, Newhouse, Darlington (2003); Magiera, Pawlak (2005); Strader et al. (1998); Camarinha, Afsarmanesh (2007); Goranson (1999); Gupta et al (2000); Gaudes A. et al. (2007).*

Process improvement, new process innovation : *Duarte, Snyder (1995) ; Raisinghani (2001); Shachaf, Hara (2005); Duarte, Tennant-Snyder (1999); Oertig, Buergi (2006); Duarte, Snyder (1995); Adami (1999); Jackson, Gharavi, Klobas (2006); Jackson (1999); Daily, Whatley, Ash, Steiner (1996).*

G-6. Evidence from Literature review:

internal performance, People performance: *McDonough, Kahn ,Barczak (2001); Mulebeke, Zheng (2006); Gaudes et al. (2007); Ortiz de Guinea ,Webster (2005); Gibson, Cohen (2006) ; Hofstede (1991); Hron et al. (2000); Jarvenpaa et al. (l998); Lipnack, Stamps (2000); Warkentin et al. (1999); Kirkman, Rosen, Gibson, Tesluk, McPherson (2002); Hunter (1990); He R (2008); Larsen, McInerney (2002) ; Abuelmaatti, Rezgui (2008); Khalil ,Shouhong (2002).*

external performance, financial performance, customer productivity : *Lipnack, Stamps (1997); Venkatram, Henderson (1998) ; Daft, Richard (1998); Tamošiūnaitė R (2011); Camarinha, Afsarmanesh (2006); Jacobsen K (2004); Winton LJ (2005).*

G-7. Evidence from Extensive Literature Review:

Virtual customer, virtual stakeholders: *shekhar (2006); Venkatraman, Henderson (1998); Byrne (1993) ; Gilmore, Pine (1997) ; Davidow ,Malone (1995); Etcher (1997); Crandall ,Wallace (1998); Jackson (1999); Cordery et al. (2009); Davenport, Pearlson (1998) ; Cooper, Rousseau (1999); Tien Van Do (2010) ; Chesbrough, Teece (2002); Koch (2002); Cueni, Marco Seiz (1999); Introna , Cushman, Moore (2002).*

Environment, customer, stakeholders, suppliers: *Das gupta (2011); Jackson, Gharavi, Klobas (2006) ; shekhar (2006); Daft, Richard (1998); Introna , Cushman, Moore (2002); Kirkman, Bradley, Gibson, Cristina (2004); Brunelle, Eric (2009); Godar, Pixy Ferris (2004); Harvey, Novicevic, Garrison (2004); Siqueira Ferreira ,Pinheiro de Lima, Gouvea da Costa (2012), Roberts ,Svirskas, Matthews (2005).*

Partnership, provider, Common infrastructure, partnership characteristic: *Durai P (2012); Larsen, McInerney (2002); Weber (2002); Pawar, Sharifi (1997); shekhar (2006); Powel (1990); WI et al. (2008); Oracle Corporation (2004); Strader et al. (1998); Camarinha, Afsarmanesh (2007); Goranson (1999); Fornasiero , Zingiaconi (2004); Daft, Richard (1998); Cooper, Rousseau (1999); Putnik GD, Cruz-Cunha MM (2008); Chesbrough, Teece (1996); Folinas D, Manthou V, Sigala M, Clachopoulou M (2004); Ganzha M. et al. (2012).*

Partner alliance, competitive advantage, collaboration with partners : *Travica (2005); Shekhar (2006); Strader et al. (1998); Martinez, Fouletier, Park, Favrel (2001); Camarinha, Afsarmanesh (2007); Nishioka, Kasai, Kamio (2003); Busschbach, Pieterse, Zwegers (2002); Nishioka et al. (2003); Putnik GD ,Cruz-Cunha MM (2008); Cooper, Rousseau (1999); Siqueira Ferreira PG, de Lima EP, Gouvea da Costa SE (2012) ; Khalil O , Wang S (2002); Caldas, Wood (1999); Rodrigues EF, Tavares Dalcol PR, Domingues Pizzolato R, Maruyama U (2013).*

VO Supplier, Virtual partner, knowledge exchange with partners : *He R (2008); shekhar (2006); Byrne (1993); Roberts B, Svirskas A, Matthews B (2005); Davidow, Malone (1995); Zaccaro, Bader (2003); Das gupta (2011); Etcher (1997); Palmer JW, Speier CA (1997). Langevin P (2008); Durai P (2012); Fitzpatrick WM, Burke DR (2000); Martinez MT, Fouletier P, Park KH, Favrel J (2001); Ale Ebrahim N, Ahmed S, Abdul Rashid SH, Taha Z (2010); Ale Ebrahim N, Ahmed S, Abdul Rashid SH, Taha Z (2012).*

VOEM Glossary of Terms:

The following is a list of terms used throughout the development of VOEM guidance material. It has been compiled in order to help understanding and use of the Model.

Benchmarking: A systematic and continuous measurement process; a process of continuously comparing and measuring an organization's business processes against business leaders anywhere in the world to gain information that will help the organization take action to improve its performance.

Core competencies: A well performed internal activity that is central to an organizations competitiveness, profitability or efficiency.

Creativity: The generation of ideas for new or improved working practices and/or products and services.

Culture: The total range of behaviors, ethics and values which are transmitted, practiced and reinforced by members of the organization.

Empowerment: The vesting of employees with necessary skills, knowledge, information and authorities in such a way as to enable them to take all actions necessary to produce the specified outputs in the most effective and efficient way. A periodic setting of clear targets gives the necessary guidance within the framework of the overall objectives of the organization.

Excellence: Outstanding practice in managing the organization and achieving results based on a set of Fundamental Concepts which will include: results orientation, customer focus, leadership and constancy of purpose management by processes and facts, involvement of people, continuous improvement and innovation, mutually beneficial partnerships, corporate social responsibility.

External Customers: The external customers of the organization. These may also include other customers in the distribution chain.

Finances: The short-term funds required for the day-to-day operation of the business, and the capital funding from various sources required for the longer term financing of the organization.

Fundamental Concepts of Excellence: The set of principles and ideals upon which the EFQM Excellence Model framework is based.

Innovation: The practical translation of ideas into new products, services, processes, systems and social interactions.

Key Performance Results: Those results not covered by Customer, People and Society that it is imperative for the organization to achieve.

Knowledge: Knowledge is part of the hierarchy made up of data, information and knowledge. Data are raw facts. Information is data with context and perspective. Knowledge is information with guidance for action.

Leaders: The people who coordinate and balance the interests of all who have a stake in the organization, including: the executive team, all other managers and those in team leadership positions or with a subject leadership role.

Learning: The acquiring and understanding of information that may lead to improvement or change. Examples of organizational learning activities include benchmarking, internally and externally led assessments and/or audits, and best practice studies. Examples of individual learning include training and professional qualifications.

Management System: The framework of processes and procedures used to ensure that the organization can fulfill all tasks required to achieve its objectives.

Mission: A statement that describes the purpose or "raison d'être" of an organization. It describes why the business or function exists.

Partnerships: A working relationship between two or more parties creating added value for the customer. Partners can include suppliers, distributors, joint ventures, and alliances.

People: All of the individuals employed by the organization including full time, part time, temporary and contract employees.

Performance: A measure of attainment achieved by an individual, team, organization or process.

Policy and Strategy: Strategy is the way an organization implements its mission and vision, based on the needs of major stake-holders and supported by relevant policies, plans, objectives, targets and processes.

Process: A sequence of activities that adds value by producing required outputs from a variety of inputs.

Process indicators: Leading indicators relative to the performance of the process.

RADAR: Results, Approach, Deployment, Assessment and Review.

Stakeholders: All those who have an interest in an organization, its activities and its achievements. These may include customers, partners, employees, shareholders, owners, government, and regulators.

Supply chain: The integrated structure of activities that procure, produce and deliver products and services to customers. The chain can be said to start with the suppliers of your suppliers and ends with the customers of your customer.

Values: The understandings and expectations that describe how the organization's people behave and upon which all business relationships are based (e.g. trust, support and truth).

Vision: A statement that describes how the organization wishes to be in the future.