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Governance of Smart Cities

Gouvernance des villes intelligentes

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Abstract

Governance of Smart Cities

Smart city is relatively a new concept, which might become indispensable in the near future. What we consider just an idea will become part of our daily life.

The smart city concept differs between continents; while the American view is oriented more toward technology, the European one is more oriented toward collaboration. Despite the fact that smart city has more than one definition, all used definitions involve development, sustainability, resilience, improvement, evolution and quality of life.

Focusing on smart cities and precisely on the outputs and outcomes of this relatively, new concept requires us to look for the most effective and efficient way to manage these cities, and what better than governance to sustain, evolve and thrive. Governance can be perceived in several ways, such as a process undertaken by a government or a process concerned with human resources, smart people or towards stakeholder collaboration. As for the governance axis, pillars or chapters, different types of governance structures and models can be found and with that comes different monitoring systems and tools that can evaluate and monitor governance developments and successes.

Despite using different terminologies, the different types of governance share similar concepts, including, a clear mission, vision, strategic planning with smart objectives, better outputs, better outcomes, participation, transparency, management and recognition. All these concepts when combined provide a framework that is made up of rules and regulations and procedures, and the process of how they are designed and controlled.

To improve the governance of smart cities, the researcher proposes the use of a self-assessment tool in order to provide policy and decision-makers, with an efficient instrument, with the aim of improving the outcome of applying good governance.

The proposed assessment tool, the University Governance Screening Card (UGSC), was created by the World Bank to assess governance of universities. This tool will be adapted to become the Smart City Governance Screening Card (SCGSC) and tested on a smart city. Based on the findings, the researcher will update the SCGSC and will propose an action plan for the selected smart city to improve its governance.

Chapter 1: Introduction

1. Background and statement of the subject

The world is moving towards a new era of Smart Cities, a time focused on stakeholders, people, businesses and the services provided by government, to achieve a better quality of life. The concept of Smart Cities is basically getting a city and applying advanced methods, technologies and managerial procedures to make it smart, in other words to improve it. Each city has a different need that can be provided for, or has different natural resources that can be used, or has different problems that can be improved on; therefore, not one process or smart application can be used on all cities.

With more people moving to cities, and the increase in population in urban areas, many challenges that already existed seem to increase, and new challenges appeared that required urban planning, which many cities were not prepared for, such as pollution, increased crime, problems with waste management, energy consumption, traffic and air congestion and many other related factors, forcing governments to try to find ways to handle these hurdles. Some cities focused on improving the problems with pollution and focused on waste management and traffic congestion while others worked on improving services to their communities such as education, health benefits, and public safety, others worked on their economies and investments and so on.

The issue stands on how can we assess the effectiveness of Smart Cities; how can we determine the success of these cities in relation to their goals and missions and how can we evaluate the autonomy of the smart initiative applied. Other areas of interest in Smart Cities creation involve participation and how involved stakeholders are in the city's initiatives. The success of Smart Cities is also determined by the effectiveness of the governing body, the decisions made, the steps taken and the management process of implementing the smart

initiatives developed, as well as their accountability of these decisions, and the governance process being followed.

How can we create projects and initiatives that benefit stakeholders and achieve a successful smart city that provides the most efficient and needed services a community would need. How can governments apply and maintain successful strategic projects within their communities that can last long enough for citizens to reap their benefits. When we consider the path cities are moving towards we try to picture communities that have security and stability, clean sanitation, proper waste and management systems, clean streets and organized transportation systems with best services provided equally to all citizens and where citizens are able to provide their opinions freely and easily. In such a community we find governments to be open with their information and clear with their initiatives and policies focusing only on the needs of their residents.so, how can such cities exist?

How do cities get affected by innovation, what areas need the most focus, what factors influence the projects being implemented, and how can cities continue to review and assess the success of these projects? How can governance implemented in cities provide the best results and provide the most efficient kind of solutions and services that the city needs. Understanding how these processes are applied, where they are needed, who should be responsible and be able to achieve successful results requires a systematic framework and structure mainly a governance process that if implemented properly would create a utopian form of urban living.

Another area of question is finding ways to encourage stakeholders and businesses and institutions to apply innovative ideas and participate and be involved in new developments and projects that their governments advocate. A very challenging factor that many cities have faced and had to deal with, especially finding ways to maintain citizen involvement is even more challenging as governments have to evaluate and assess how successful they are and how responsive the people are to their initiatives. Creating a collaboration between the public and the private sectors that both can benefit from is not an easy task.

The importance of having a clear vision that can be followed and achieved for the sake of the people is an important focal point in Smart Cities and Smart governance. It is considered the main target to be achieved. As a result, we tried to look into the various aspects of cities, their principle governance structure, and type of elements that affect that. We reviewed and tried to explain the different areas of governance and how projects and initiatives applied in cities have influenced the cities they were developed in, and how they can affect the city as a whole, in all its aspects and corners and services, by considering how smart projects are applied in city structures and locations and their effect on the development and progress of these urban areas.

Governance is a form of structure that is needed by cities if they want to grow and expand and become smart and with the help of assessment tests and continuous review and assessment of any initiatives introduced by governments, cities can achieve effective living standards. After much research we suggest a successful form of governance tool that is needed by cities to review their governance strategies and how to maintain them.

2. Purpose and significance of the study

The reason behind this document is to provide an insight into the requirement of Management and Governance in the creation of Smart Cites. Trying to help cities evaluate the way they apply their initiatives in order to meet the challenges of governance they may face. These challenges can range from the institutional level, to strategic methods and projects, they can be affected by the goals and missions set, the path they are working towards, and the purpose of trying to achieve an eco-friendly sustainable environment.

There are many challenges that force governments to re-evaluate their governing system to try and improve themselves. These factors are usually connected throughout the government's departments, when we find political constrictions that seem to result in economic limitations, or economic constraints that are conflicting with the country's

environmental and territorial existence. Governance is necessary when we need to consider these aspect, as having a good governing structure would allow the different governmental branches to have positive effects on each other, such as political reforms that are required to help improve the economic status of the country or the economic developments that are introduced to enrich the environmental aspects of the country and many other strategies that are intertwined.

When we look at the strategies used to improve the economic situation of a country, we find that changes in the existing political institutions is always a requirement. Creating a governance framework to handle the challenges faced by governments is not easy. With the right type of governance implemented we can create political reforms that help establish new opportunities and fewer restrictions created in the economic arena, market-oriented changes, global attractions and investments that would have otherwise not been considered. When we want to consider improvements applied on environmental factors, with the right governance strategy designed, we can create changes on the economic levels such as private property rights that might help improve the market, reforms can be applied on the pricing system. (Ahrens 2009)

When applying new strategies, policies, projects and even technological advances to improve a city or an economy, governments need to assess the success of their decisions and how tactful they are. Various principles of governance can be used when improving a city's services or economic status and it is important for governments to maintain these governing ideas and steps and continuously maintain their use. Having a system that can aid in defining what steps are working and what areas need further work is necessary, and the idea suggested in this thesis is a clear example of a successful assessment process needed by Smart Cities. A tool is suggested in order to help academics and practitioners understand and test Smart Cities. With the creation of the idea of "Smart Cities" comes the need for providing a system that can be followed to achieve the needed outcome. Applying advanced methods and applications to these cities need to be structured and a Governance framework needs to be implemented; with this, a monitoring system needs to be applied that can monitor and

evaluate these applications and how successful they are to provide ways for further improvement, allowing them to handle all the pressures and challenges arising.

One of the suggested monitoring systems is the University Governance Screening Card (UGSC), this monitoring system allows cities to monitor how their applied smart initiatives are doing and show them where they need to focus to further improve themselves. The monitoring system presented in this thesis was tested on a Smart City created in Lebanon, called Beit Misk and how this system was used to provide insight on what the city has achieved from its smart initiatives.

This thesis highlights the importance of Smart Cities identifying the best solutions, projects and strategies they can for their communities, and continuously evaluate and assess them to understand where their strengths and weaknesses are, to understand what they have to work harder on, to understand what they need. And in order to help these Smart Cities evaluate the outcome and success of their initiatives and strategies, the researcher introduced, with the help of a tested case study, a tool that can be used to achieve that.

3. Challenges of a City

It is expected that by 2030 the number of people living in urban areas will boom and while the number of megacities has been limited to around 10-11 for decades, this number is expected to increase to around 500 cities by 2030, as predicted by the United Nations. With this amount of cities appearing in the coming years the challenges cities face are extreme and cover a wide range of areas, making cities become unmanageable unless they are provided with the right governance system and enough resources to handle this expansion. The effect of living standards brought by this growth in numbers of city populations affects practically all areas of urban life, from basic public services such as water and electricity, to the use of natural resources. (United Nations 2014).

Adopting projects and strategies to improve the living standards of cities has become a priority for governments. When considering the different areas of focus that can be improved and the different applications and solutions that are being adopted and developed every day, we find more governments working harder on setting goals to become better, become more sustainable, more resilient, smarter, more globally competitive, and provide better, improved and smart services for their citizens. In order to try and provide a clear way that can allow governments to assess their choices and evaluate their progress, the next section provides a view of the different challenges' cities face and the different ways governments are using, smart and productive initiatives to solve them. With this explained, we can have a clearer idea why we need a tool such as the one the thesis proposes to aid governments with the projects they adopt.

I- Urbanization Challenges

The main challenges cities are facing with this growth is the ability to manage the overwhelming task brought by this amount of people and what issues that come with a growing population. Challenges of having a clear governing system that can handle all what a city has to offer it's people are endless and affect the city as a whole, including the government, stakeholders, businesses, resources, infrastructures, as they emerge from poverty, pollution, unemployment, traffic congestion, health problems, environmental problems, water and energy waste, insecurity and many more.

Urbanization challenges are a result of dated management structures, or traditional governmental processes that have not been updated or are not prepared for the increased migration of people into cities. Lack of preparation and the difficulty in handling the large amounts of residents have affected governments and cities as a whole. In order to be able to handle urbanization, cities have to focus on the different areas in more detail and with more structure, creating proper governance systems or frameworks and following them accurately.

II- Environmental Challenges

With more people coming into the cities and not enough healthcare facilities or systems or waste management to handle them, many health problems are rising, more pollution is occurring, and use of natural and existing resources are being employed. There are many **Environmental issues** arising from these moves. Many cities have dated or inefficient water and waste management systems, and some even lack sanitary landfill and proper sewage systems that cannot handle the large number of people they are welcoming into their cities. Governments are challenged when it comes to controlling **Pollution** and **Congestion**, with the increased number of people in cities the level of pollution has risen greatly and not enough awareness has been provided. In cities, people consume more food, and use energy and transport much more than in other areas. These kinds of living patterns affect cities and their environment, for example, more people drive cars in cities that result in pollution and traffic congestion and many other related issues. In addition, city residents use up electricity in the homes and offices for all kinds of reasons, for household electronics, air conditions and other energy consumptions (Torrey 2004).

When we consider the large amount of people commuting throughout the day, the continuous traffic congestions and the gas emissions vehicles make, we can imagine the effect it has on the air quality, especially when governments do not have adequate environmental laws that consider a city's environmental and air quality concerns (Charlie S, 2018). Other polluting concerns that can be challenging to governments include the use of polluting waste products that cannot be easily recycled such as plastic bags and plastic bottles and many substances that are not environmentally friendly, as a result of more people living in cities, with fast-paced living and have no consideration to the amount of garbage they pile up daily. The increase in garbage can have its challenges on cities as they are not easy to recycle and fills up landfills, polluting the areas around it and can have long-lasting effects that continue for years (Zhanga K, Batterman S 2013).

Water Sanitation is another problem that governments have to deal with, as their cities grow the amount of household wastewater increases which require a proper sewage facility to handle a larger drainage capacity. Many governments are not prepared or have the right sewage management system. Creating a new facility to handle waste required time and capital and in many cases most waste end up polluting whatever is around them until a solution is provided. Some cities' sewage system are linked to the closest lakes, seas or river which in turn gets polluted with any waste the city makes whether it is household waste or industrial waste, Medical waste, even municipalities dump their own waste in unmanaged areas that affect its surrounding (Brennan-Galvin 2011).

Safe drinking water is basic requirement of living and is the basic service governments should be able to provide their people. But with urbanization, the idea of pollution, congestion, overcrowding, slums and excessive waste produced daily, this necessity might end up becoming a luxury, as clean water seems to be decreasing in many parts of the world. The increase in waste has cause water to become contaminated as many sewage systems pour out to rivers and water sources of cities. Considering the same matter we find that in addition to water being absorbed by land, construction sites and waste produced by industries also have an effect on soil which in turn affect the agriculture field (Rashid H, Manzoor MM, Mukhtar S 2018).

As cities grow, many residents require more water and better sanitation. In many cities, this has become an issue and is considered one of the main challenges' cities face. Waste management has become a very important topic as management of human waste and other substance waste is linked to pollution and clean water. Lack of proper sanitation and hygienic methods that provide safe water supplies can in many cases result in contaminated water, and with the environmental factors and their effect on the weather, the increase in heavy rains, storms, and floods, the management of waste is a major aspect in urbanization. (Solans 2010-2011)

In other areas of a city, we find that energy and waste management are also affected with the increase flood of residents. Governments find it difficult to provide a good quality of living for its citizens when faced with this much scarcity in services and the problems faced from CO_2 emissions in buildings. With problems in resources and urban planning arise transportation services, water and electrical management as well as pollution and congestion problems, all of which affect residents and stakeholders (IMF 2007).When looked at, the European Union's energy consumption seemed to be coming from buildings, almost 40% consumption. To work on this issue, a European Union initiative named CONCERTO revealed that if a cluster of buildings were joined together to apply energy-optimization, it would be cost-effective that applying it on each building separately.

With Urbanization we get development and modern designs, these projects and modern applications have with time affected the environment, natural habitat, as well as air and land status. Throughout the years we have started to see a reduction of natural habitats and replacement of plants and trees with concrete and roads and asphalt to build more infrastructures which do affect the flow of water from rain and cold weather to flow towards rivers and lakes and seas instead of being absorbed by natural plants and trees. With the reduction of plants and green lands we find in the absorption and reflection of energy that has an effect of Climate Change and as a result in last years we find cities becoming warmer in the evening that in rural areas. In addition, cities attract more rain as a result of the pollution dispersed in the air from traffic congestion and the increased emission from the increase in population of cities. (Bhuvandas N, Uttara S , Aggarwal V 2012). As many cities have not prepared themselves to the increase in population which has had its effect on climate change, we find that governments are not prepared for many natural occurrences such as flooding. Climate change has caused a shift in lands and weather which has created situations that cities have not been faced with before and unless a city is prepared for them, they could have devastating outcomes (Andersson, K., Dickin, S., Rosemarin, A. 2016).

In other areas, we find that animal and Wildlife is also affected by this rapid change in urban living. With more cities growing and less places for species to live in, there are risks of animals not being able to find new living areas, from dying out. Unlike birds that can fly out to find food sources in other locations, many animals are not able to move. In areas such as Johannesburg, South Africa, the Blue Sparrow was found to be affected by the fog created from sulphonate concentrations that kept its feather wet, making it difficult for it to hunt for food. Even though this bird hunts in the fog but with wet feathers its path is limited (Isaksson C, Sumasgutner P 2016).

Agriculture has also been affected by the shift in population to cities. With the increase in people leaving the rural areas to work in the city, less people stay to cultivate and grow their lands, which have affected agriculture productivity, crop production and land utilization (Winfield 1973). This has also affected the production level of products, with less agriculture; fewer products are available for the demand made by the urban dwellers, forcing them to create alternatives to crop production. In addition to that urban living requires more space and as a result many rural lands have been replaced by areas for urban use, and industrialization and replaced by commercial projects (Raphael I O, Ukandu I 2015).

III- Globalization and Economic Challenges

Another challenge that cities faced is related to Globalization, with the introduction of free markets and new technological advances, people have been encouraged to move to the cities. Applying better services for living and providing better shelter is just part of the solution. Being able to maintain the solutions, they came up with introducing newer modifications and renovations which is the only way to handle the continuous increase in urban dwellers. When it comes to globalizations, it is important for cities to leave a mark to help encourage outside businesses to work and invest in them. This is not possible if there is lack of proper venues, locations, infrastructures, multicultural corporations and businesses, media presence, tourism, cultural attractions, basic social services such as

clean air and sewage treatment facilities, proper roads, electricity, as well as access to technology (IMF 2007). Nor is it possible if the basic structure of the city is not prepared to meet with the economic and political collaborations it is expected to engage in. Without the proper governance system, and the required political stability and the open economic framework required to handle global trade and the international investments and partnerships and world communities, cities cannot be expected to handle urbanizations in the same pace as modern communities (Hirabe 2009).

From another point of view, globalization can have a negative effect on markets and countries depending on the country's situation, market fluctuation and investment tendencies. If countries are not prepared for international financial markets, then with inconsistencies in policies and laws designed for international businesses and investments, countries will be greatly affected and any change in basic principles might result in negative outcomes. If countries have any kind of instability, then investors might not be encouraged to continue and this might backfire and adversely affect markets (Schmukler S L 2004).

IV- Urban Service Challenges

Some of the challenges from the rapid overflow of urban residents include the fact that many cities are not physically prepared for such a great surge of people, first of all lack of urban planning. Not being prepared to offer people a safe and secure environment with the minimum services required is not a good start as it would lead to many risks that governments are not prepared for.

For instance, **Housing and Cost of Living** have a great and main effect of city dwellers. Considering that Housing is the basic kind of facilities that residents require and being able to live in cities in an affordable way is a minimum requirement. If governments do not have the ability to provide shelter for their people then as a result, many end up living in slums with no space or appropriate shelter increasing the chances of diseases spreading and the limited abilities of governments to provide better sanitation for them.

Being able to provide appropriate shelter for people would be very difficult for governments if they do not have the right urban planning strategies created yet. In many cities the fact that many people cannot afford to buy land or have appropriate access to payment of housing has made it hard for them to have stable sources of income or create for themselves better living areas (F&D Finance and Development, 2007). Another point to consider is that many cities require higher taxes for transportation costs and certain daily required products; this affects the way people spend money and their ability to keep up with the rising costs that seem to increase with the increase in populations in many countries. Citizens have to consider the costs of their daily needs, food expenses, transportation expenses as well as their rent and many other necessities, that many are unable to afford. (Charlie 2018)

When considering these issues, governments would be challenged when it comes to Healthcare. With Density of cities along with poor housing conditions and bad living standards could lead to diseases and sicknesses that require proper healthcare. With environmental implications many diseases and infections are rising and finding space to welcome large crowds of people, at some point hospitals and healthcare facilities cannot handle large amounts of people at the same time if they are not prepared for that. Finding government funded or less expensive healthcare facilities is also another issue as more people expect the government to take care of them.

Another view on healthcare focuses on people's diets and on what they eat. As people move to cities, their lifestyles change and they focus less on their health and more of the concept of living in a city, this comes with many taboos that could affect their health. More work would mean more stress and might mean no exercise, people can also be affected by tobacco and alcoholic consumption, unhealthy eating habits and lifestyles and all these factors could affect people's health. When considering all these factors we can see how it can be a huge challenge for governments to provide for their residents with

the already existing healthcare facilities that are most probably not prepared to handle such large number of illnesses if that might occur. (WeForum 2015)

Social instability is a subject that affects cities, in many aspects. People move into cities for better job opportunities and with the excess amount of persons the chances of work for many becomes limited resulting in poverty. From another area no urban planning has been found to have other negative effects on cities as almost half of the urban growth is taking place in poor neighborhoods, causing a bigger gap between social and economic levels of people, and increasing poverty. We find economic inequalities in many areas, where extreme sides of the social medium exists, the extremely wealthy and the extremely poor, and when faced with such situations it can affect society especially when there are problems of unemployment issues rising and lack of solutions offered. These kinds of challenges need to be handled with care in order to provide fair answers that can accommodate everyone (Charlie 2018). Having more residents in compacted areas has also led to crimes and less job opportunities and lack of basic human care as more people move to cities expecting to find work and many ends up in competition with others for better living costs, better jobs, natural resources and many other issues.

Also considering social instability, we find that low incomes and low standards of living brings Crime and Insecurity, which may result in low incomes, recession, food scarcity, rising prices of everyday necessities and many other factors. Cities may not always be prepared for such factors and may not be ready in handling them if they occur. These problems have posed a threat to governments as more people have resorted to criminal activities or have become homeless (Rainwater 2016). With the increase in the number of people moving into cities, governments should be able to provide the basic civic duties, law and order with the right law enforcement, but with many drifts that exist between people and communities and rises of social instability and lack of jobs and high expenses, crimes could increase especially when cities become overcrowded and cannot be controlled properly.

Lack of safety in many areas is an issue that not many cities were prepared for and they can have great effect on a city as a whole if they are not dealt with properly as they can affect the social separation between rich and poor. These problems create geographical changes in cities, they can also lead to changes in the daily patterns of people, in how they use public service, transport methods, and even building of infrastructure and opening or starting out businesses may be affected (Brennan-Galvin 2011).

Then there is **Education**, more educational institutions have been required and needed to welcome the growing amount of students. In addition to that, these educational institutions have been required to be open to all genders, ethnicities and race. In addition, educational institutions are important in providing citizens with a better understanding of the problems and economic factors of the society they live in and provides them the education to handle and respond to the civic and democratic challenges they would face in cities (UNESCO n.d.). Creating an environment where students experience the value of smart and clean initiatives is very important and educating the next generation of that is needed to allow them to be involved and motivated and informed about their significance.

These challenges and many more have an effect on **Infrastructure**, with the expanding size of cities; the existing infrastructure may not be adequate or able to handle this growth, whether they are buildings, residences, electricity, roads, streets and railways. Existing infrastructures should be able to handle the increase in residence and residential areas (Lehmann 2015). Cities faced with the increase in the number of inhabitants had to find ways to work on their infrastructures that were affected by the large amount of residents that suddenly took over. With the need to provide infrastructure that can handle the surge of people into cities it means that more investment needs to be provided into cities, more funds need to be directed at them and their maintenance. The challenges in this matter also involve the funding issue, where will governments provide for such large budgets and how will they be able to maintain such large projects and infrastructures to last a long time.

There are ways in which city officials can manage the issue of infrastructure financing, such as encouraging public- private partnerships, but in order to promote this collaboration, corruption should be eliminated as many private businesses are not encouraged to invest in governments that have corrupt agencies existing around them (WeForum 2015). In this same topic, applying technological projects to infrastructure to make them advanced and more smart could have its downside when it comes to educating people about them and providing way to encourage citizens to take advantage of new concepts they might not be previously familiar with, this in turn is affected by how transparent governments are and how informative they can be to their citizens in informing them and educating them about the projects and infrastructure renovations they introduce to their cities.

4. Solutions for Urbanization

Urbanization has led governments to search for solutions to prepare themselves for the challenges they faced or will face as the move to cities is increasing. Different cities, organizations and agencies have worked hard on providing solutions that can be applied into different areas of focus. Considering the fact that cities are not equipped to handle the sudden surge of people many ideas and initiatives focused on specific areas that are considered the vital points of each city.

In order to help residents who were not prepared for the lack of opportunities and assistance when moving to cities, the government can work on providing financial solutions to help these citizens buy land, housing loans and such. Governments can also work on providing proper transportation systems, that are not expensive, build roads to ease access of moving from one area to another, improve existing infrastructure or build new areas for living, for businesses. Governments can help startup or small businesses, provide access and

encouragement to economic opportunities and even simplify the requirements needed as well as provide financial assistance (IMF 2007).

An example of housing problems is clear in the situation of South Africa, when it gained independence, this encouraged the move of people from towns and villages to the city and with many ending up living in the Slums, creating solutions to this growing problem was the priority of the African country. As a result, a funding program was created in Pretoria, the capital, in 2016 named the Participatory Slum Upgrading Programme (PSUP) launching a campaign to help the slum dwellers in an effort called, 'Up for Slum Dwellers – Transforming a Billion Lives', that was aimed at helping citizens with housing problems. This program provided funds for developers and contractors to create the basic infrastructures needed; helping thousands of people to find shelter (UNHabitat 2016).

For cities to advance and keep up with globalization they should provide the minimum in order to attract outside markets, such as creating a diverse environment attractive for international businesses and generating a cosmopolitan atmosphere that will lure global corporations to them. Preparing agencies, building exceptional architecture and applying an attractive view of their cities in order to welcome such investments and ventures as well as develop the proper financial institutions needed, is very important. In other areas, if it is not very applicable to work on all these areas, then a city should work on its image as a cultural location, work on its tourism, to encourage investment, and attract visitors to it by establishing its own unique geographical footprint.

Having financial globalization is very beneficial for countries, especially the developing countries that are trying to follow in the footsteps of the already developed countries and to avoid being left behind. This global interaction will help countries become connected and integrated with other international markets encouraging competition, promoting distribution of funds, and with the need to adapt to international standards, it encourages governments and markets to become more transparent and more open to international trade. These will

automatically affect markets and businesses and increased competition will allow more and better products to be provided (Schmukler S L 2004).

Example in India, even though Mumbai is well-known for its overpopulation with old infrastructure and waste management problems, it was able to create an interesting cultural scene, focusing on its ability to produce movies through the famous Indian movie industry, Bollywood, that spans all over the surrounding continents (IMF 2007).

One way that was used in relation with energy consumption involves educating students in schools and applying energy control measures in the academic institutions, both to allow students to be part of the process and to apply these measures in areas that use a lot of energy. Concerto, a European Commission initiative provided the "Solar for Schools" project to six different Schools in Lambeth, London in England. This project applied solar photovoltaic (PV), thermal panels and a weather station, to all the schools' electricity and heating systems, with continuous technical energy audits with building reports and recommendations provided for future energy saving methods. This process resulted in an extreme reduction in the energy consumption of the whole area. In addition, the schools provided extensive education programme, educating students about the different types and ways to save energy (CONCERTO 2014).

Working on infrastructures, cities needed to work on different areas that were all considered part of the daily life of citizens. With projects on mobility improvement, climate change applications, ICT implementation and development of smart buildings, the space of focus is very wide. But in order to assure that the applications of smart initiatives are applied properly there are several components that needed to be applied that included as a start, making sure that the applied methods were safe and risk free especially in ICT initiatives that might be prone to hacking or shutdown. In another area of focus, infrastructures have to be flexible so that they can follow whatever future modifications are applied as technology is always progressing. Infrastructures have to also be resilient and sustainable to handle any extreme situations or changes for example buildings. Lastly, infrastructure's main purpose is to help

provide a better way of life for citizens, therefore applying smart infrastructures should be aimed at what the people's needs and quality of life required (Smart cities and infrastructure 2016).

5. Thesis objective

The following thesis will discuss in summary the concept of Smart Cities. The information provided will explain how cites evolved into becoming smart and the steps it takes to reach this point. Each section is broken down into areas of focus that are major in turning cities into smart futuristic metropolises.

The first part of the thesis provides an explanation of what cities are, the challenges they face, with solutions on the different areas that they have issues with. Then we will provide a description about governance, its definition, and why it is vital for any city administration. The thesis will continue with the different principles of governance required as the foundation of what city administrations need and will continue to establish a clear view of how smart governance can help in developing smart cities. The application of smart governance will be mentioned in detail and how each can provide smart methods of success to cities on areas they need to improve on that will allow their services and global presence to advance.

The next section will discuss Smart Cities, smart city concepts in regards to the economy, mobility, people way of living, governance and the environment. With concepts being provided, the different dimension relating to Smart cities will be provided and how they can be applied to provide smart solutions to cities, and then examples of different initiatives will be given from agencies and countries all over the world that have been implemented, allowing cities to become advanced and smart.

In a world that provides easier living, simpler and effortless ways of existence and being in contact with other people, informed and updated while living in a clean and organized world that provides the best form of quality of life, we find Smart Cities. These cities are appearing now throughout the world and they are going to emerge in many cities around the globe. How do these cities know what their communities need, and what type of smart innovations

and solutions would help them improve and advance in the world? Without the right type of governance, such ventures and plans will not be able to succeed.

Cities are working on modernization, technological advancements to provide the best for their citizens. In order to achieve this we find that governments are working in every way to reach the highest level of good quality living they can and continue to try and out due themselves with whatever opportunities they can find and applying all the solutions existing in the world or studied in the world to overcome their weakness and improve themselves. How are government officials capable of knowing what their cities need and how can they assess the progress of the solutions they apply?

As many cities have worked on improving themselves throughout the years, many have applied certain governance frameworks and systems when introducing new administrative reforms to their governmental organizations, departments or projects. With the introduction of Smart initiative and smart innovative developments, more governance systems have been applied or created. In order to help these governments and cities reach their aim we have to understand that not all projects or innovative solutions applied will work. To be able to help these cities achieve their peak we have provide an explanation on what makes cities Smart and what areas are focused on and how cities have to evaluate themselves to continuously improve themselves. How innovations applied in certain areas can be improved and how governance and accountability can be viewed and in what areas these cities should concentrate in order to achieve what they want.

This thesis looks at the different governance approaches cities have been adopting in the last few decades and how smart governance has been a major factor in allowing these cities to handle major obstacles and improve themselves in the global arena. With these points explained, the thesis aims to provide a way to help cities, governments, organizations and businesses assess the smart applications and projects they use or adopt, and allows them to identify what areas need to be improved and what areas need to be changed. It focuses on the human aspect of governance, communication, collaboration, involvement of

stakeholders, the natural resources, infrastructures, environmental aspect of cities, the improvement of quality of life and the way governance can be present in all these areas.

The final areas of this thesis will include a tool that can be used to assess the Governance of smart cities. The researcher proposes the use of a self-assessment tool in order to provide stakeholder, policy and decision-makers, with an efficient instrument, with the aim of improving the outcome of applying good governance, and allow them to evaluate their progress, find out where their strengths and weaknesses lie, so they can work on their programs and projects to improve and advance. The *University Governance Screening Card (UGSC)* has already been developed and used on universities and educational institutions, as they seem to represent small communities, but the researcher adapted it to be used to assess the governance of smart cities. In addition, this tool can be used to follow-up on any new plans for a new smart city. Governments can use this tool if they are considering creating a smart city for zero and this tool will help in setting the road map of the governance of that city.

In order to comprehend the University Governance Screening Card (UGSC), we have provided a case study in which this tool have been applied and with it we provide a detailed explanation of how information was collected, and how this tool is effective in knowing what areas we can evaluate and gain information on, for future research and review of any smart project implemented. The researcher found Beit Misk, a newly formed smart community in the country of Lebanon. The screening card was converted to adapt to this community and assess the SMART objectives it promises its stakeholders, including smart environment, smart economy, smart living and smart governance. The screening card was tested on this community and evaluated indicating the factors that were successful and revealing the areas that needed further work and improvement. What needs to be done next is to test the efficiency of the scores, at a later stage, in Beit Misk in order to compare how the modifications and improvements have been. This factor can be applied on other cities too, comparing their first stages with their future stages of development and progress.

6. Chapter summary

To be able to understand the remainder of this thesis, this chapter introduced a view of what the cities of the world are facing now and what challenges they are going through. This thesis provides insights into different areas providing an explanation of the different factors that impact cities, such as managing the overwhelming amount of people moving to cities and issues that come with a growing population. Additional factors affecting growing cities include having a clear governing system that can manage government responsibilities, handle stakeholders' interest, businesses, the city's resources, infrastructures, and many other issues. Other factors affecting cities that need to be highlighted include environmental factors as the populations in cities increase, many cities are faced with not enough healthcare facilities or systems or waste management to handle them, many health problems are rise, more pollution is occurs, and use of natural and existing resources are abused.

City officials have to consider climate change, pollution, traffic congestion, sanitation, water and waste management, that people consume more food, and use energy and transport much more than in other areas and how these kinds of living patterns affect cities and their environment, as well as healthcare and public services, housing availability, stability, security and many other areas that need to be measured. There are even global issues that have been mentioned that affect cities. When it comes to globalizations, it is important for cities to leave a mark to help encourage outside businesses to work and invest in them, explaining the requirement to have the proper governance system, and the required political stability and the open economic framework to handle global trade, the international investments, partnerships that come with globalization.

And to complete the chapter, there has to be a few points explaining the solutions that can aid smart cities in applying the right initiatives and succeeding in implementing the proper governance system to achieve the best for their residents, such as providing better work opportunities, housing facilities, encouraging businesses, global interaction, working on their

pollutions and waste management departments, introducing technological advances to aid in their services.

The chapter then provides an explanation of the need for the thesis; it introduces the University Governance Screening Card and how it is beneficial in improving the outcome of applying good governance, and helps city officials, or smart project managers evaluate their progress, find out where their strengths and weaknesses lie, so they can work on their programs and projects to improve and advance the implemented initiatives.

As it will appear in the next chapter, in order to introduce this tool, the thesis starts by defining the concept of Governance, and how this term was created and developed throughout the years by different countries and organizations. It continues to explain the different types of governance and how the concept of governance can be applied on various platforms and situations, specifically good governance, to create a form or structure that can be used to achieve a better systematic and clear framework of processes. With the understanding of governance, we can have a clearer idea of the need to apply the suggested tool and how important it is to have a form of process that can help us assess any strategy or approach we apply to achieve certain goals, mainly smart approaches.

Chapter 2: Governance

Cities are constantly working on improving themselves, especially in a time of change and evolvement. As cities face many challenges and to be able to handle these changes and hurdles, it is crucial for cities to try to redesign and reform their administrative and managerial system. The decision-making process and the monitoring of the implementation process and the application of the steps created to improve a city should be maintained by a good governance body. Throughout the years it has become apparent that different times require different form of management. During the early 1950s the formal way of governing was the hierarchy style which then changed to focus on market changes and the emerges of the trade markets and this was the new governing era, the market style. By the 1990s technology emerges and with this new concept came the modern governing technology style. (Meuleman 2008)

1. History of Governance

In the 1980s, slow growth and declining terms of trade had resulted in major political turmoil and a severe decline in governance in many parts of the developing world. At a time when it was politically unacceptable to complain about the cruelties of regimes and the corruption and chaos governments practiced, the only way to control the situation was to apply a new form of government management (Maldonado 2010).

In Sub-Saharan Africa, the time of democratization had begun with Nelson Mandela's release from prison in early 1990 marked the beginning of a period of in Sub-Saharan Africa. The year before that event the situation in the region was at its worst and a Perspective Study, "From Crisis to Sustainable Growth" by the *World Bank*, was issued focusing on the economic crisis the area was experiencing having very low exports, an increasing debt and low industrial performance as well as very weak growth in agriculture. In addition, other reasons such as dictatorships falling and becoming democracies in regions such as Latin America, Korea and

the Philippines, the collapse of the Berlin Wall, the Soviet Union disintegration and the disruption of the Eastern region's political and economic alliances, came the concept of governance.

Even though the World Bank worked on many Structural Adjustment Programs, the situation both economically and politically worsened. The World Bank decided that a complete transformation should be done on the regions' policies and institutions, and so on 1991 issued the "*Managing Development - the Governance Dimension*", discussed at a meeting of the Bank's Board acknowledging the concept of Governance. This was the first formal policy statement that the Bank decided to become involved in issues of governance to work on issues of public sector management. The concept of governance was then introduced, to work on the problems facing African countries and creating a more structural process for the democracies rising at the time. It was presented to describe a new institutional system that includes reformed practices and improved public services (Streeten n.d.).

After meeting and discussing with several African leaders the new reforms to be applied, the World Bank created a draft report that included the reforms to be adopted. But this was received with a message highlighting that such report neglected what the region's main problem was and did not include the main ingredient that was needed, which was creating proper and correct governance solutions to be adopted. As a result, the writers of the first draft created a new report, which initially caused the Bank to break its tradition of getting involved in politics. This was necessary in order to create a form of governance that can be used by the region, and thus defined governance as a system "a political power uses to control its country's affairs", but by 1992 the term developed and one publication described governance as the process applied to manage a country's resources for development (Lateef 2016).

With time the World Bank considered governance as "Good Governance" even though the term "good" was not used frequently, it was still used as reference when talking about governance.

In the United States, the concept of governance was introduced due to the decision-making task given to managers in an effort to guide them into applying their jobs properly. As the system of management changed throughout the years, the concept of large companies growing and are owned by shareholders began to expand. This type of system required that managers have a governance framework to follow in order to achieve what the shareholders needed, without them becoming directly involved and in order to protect the financial investors (Charreaux 2011).

2. Explanation of Governance

While the World Bank had one view of governance, other organizations that provided their own insight of the term governance, such included the International Development Association (IDA). IDA's suggested governance as a" factor to be considered when deciding how to utilize a city's resources and that efficient policies and appropriate partnerships would help in controlling poor countries and enrich them if applied correctly. Then there is the The Asian Development Bank (AsDB) that defines governance as "the manner in which power is exercised in the management of a country's economic and social resources for development". The African Development Bank (AfDB) defines governance "as a process referring to the way in which power is exercised in the management affairs of a nation".

The United Nations Development Programme (UNDP) defines good governance as "the exercise of economic, political and administrative authority to manage a country's affairs at all levels." The European Commission's (EC) input on governance includes "the state's ability to serve the citizens. It refers to the rules, processes, and behaviors by which interests are articulated, resources are managed, and power is exercised in society" (cited from UNDP, 2007) (Maurseth n.d.)

The Organization for Economic Cooperation and Development (OECD) is one of the well-known organizations that actively encourage good governance practices in the countries it

works with. The OECD believes that by applying good governance in their internal departments and services, governments can improve the collaboration between them and their communities and residents. Good governance is important in areas of management, and citizen participation, as well as areas that include policy implementation or reforms, even in e-government systems. Good governance can also be vital in areas that promote sustainable development and policy-making (Wouters J, Ryngaert C 2004).

The World Bank considers that the factors that affect good governance are participation of citizens, accountability of the governing body for all aspects and polices implemented, as well as political stability and absence of violence to provide safety for the community and encourage more investment and collaboration. It is important to have a regulatory system that hands all problems that arise and control all sections of a city and following the rule of law is vital by all stakeholders involved and fight any corruption internally or externally (Mas J.T, Diez A.A, Martínez M, Pagán J 2013).

The International Development Association (IDA)'s choices of the main principles of governance focus on accountability in the financial aspect of a city's resources, expenses, cash management, health services and education and all issues relating to living standards of citizens. Transparency of investment decisions, government plans and considered policies and corruption control. IDA also considered a fair and stable legal system is needed with a clear idea of rules and regulations applied. Then there is participation of citizens in decision making, as well as in the design and application of policies and projects to encourage collaboration and commitment (IFAD 1999).

The Asian Development Bank (AsDB) suggests the elements that define governance to include Accountability of public office decisions and evaluation of their economic performance as well as participation of stakeholders in decisions on projects and implementation process. Other areas of focus include predictability, it considers policies and laws should be clear and followed to the point with clear predictable action developed under

any situation that arises Then there is transparency of information to the public on all rules and regulations applied as well as information (IFAD 1999).

The African Development Bank (AfDB) governance focuses on five elements, Accountability being accountable for how public assets are being utilized and how successful governance practices are. The second characteristic required for good governance is being transparent, and government policies should be publically available for citizens and stakeholders should be encouraged to participate in decision-making. Good governance should fight corruption and fight personal gains from public office with a clear and proper legal and judiciary system (IFAD 1999).

In the opinion of The United Nations Development Programme (UNDP) requiring the right processes and applications for citizens to get their opinions and needs to be heard and considered. Governance was characterized with Participation in decision-making, with freedom of speech. Rule of law in which all laws and regulations should be enforced in a fair and legal way supporting human rights. There should be Transparency, providing free information and allowing easy access to needed information. Governance should also be responsive, serving all stakeholders equally and should provide mediation and be able to reach a consensus on policies and procedures that suit all parties. Another point the UNDP considers important is Equity providing equal opportunities for both males and females. Governance should also be efficient and effective and decision makers should be accountable to the community and stakeholders at all times. Governance includes having a vision that needs to be achieved without compromising the cultural and social existence of the city and working on achieving this vision using good governance (IFAD 1999).

When Governance is applied properly and all the elements are followed appropriately then most cities will exist with no problems and conflict. May cities thrive to achieve this kind of stability in many of their departments and regulations. When working of challenges that cities face, new and technological solutions are being introduced that have helped governments achieve many of their goals quicker and provide the right steps to maintain, follow-up and

implement them properly, including technological advances and digital solutions which is becoming an important way of following up with the modern form of living and trying to become smart is the goal of most cities.

3. Type of Governance

After explaining the history of governance we can conclude that this structure was created to solve problems that are related to managing of a city, organization, business, country or any entity that had people responsible for certain results and outcomes that required a form of management to allow some kind of organization and hierarchy to be designed. As many concepts relating to governance has been developed, we find that each is created for a specific factor, below is a brief of a few governance types that show how governance can be applied in many forms of an organization or managing body, with more detail given to governance types that are related to this thesis, such as territorial governance.

Governance that focus on the managing aspect of an organization can be explained by the following types, providing a brief view that management has an effect on outcome of decisions.

I. Behavioral Governance

When governance was introduced as explained earlier, in the United States, the idea of separating the control of shareholders from the interest of the organization and as a result of the potential effect of shareholders in businesses, and to limit their interference in management, (Charreaux 2011). Behavioral Governance structures were designed to understand management's impact of biases, where and how errors are made and how to avoid them.

II. Cognitive Governance

This concept focuses on management and their ability to handle factors required in improving their organizations. It is aimed at the ability of a manager to do what is best to achieve value creation, providing value in services for clients and value in investment for shareholders. By building the knowledge and skills needed to achieve the best performance, cognitive governance guides managers to focusing on the cognitive behaviors required and ways to improve them (Charreaux 2011).

III. Collaborative Governance

The way a government is steered depending on the governance type it adopts, and in order to make this process successful, all types of persons should be involved, therefore using private efforts has been considered necessary for strategies and policies to be adopted and achieved. With the increase in the factors that governments have to deal with such as social and economic elements, governments have to stay ahead when dealing with any crisis or situation they are faced with and in order to be able to handle any pressures or make any decisions they need to work with citizens and stakeholders to achieve shared objectives (Jolanta S, Eglė G, Jurgita S 2014)

For adopted decisions to achieve effective and successful results, experiences and knowledge need to be shared, therefore, as important as hierarchy and leadership is, hierarchally structured governments have moved towards networked governments and focus is shifting towards interorganizational partnerships between public and private sectors. This has encouraged stakeholders to take part in decision making and cooperate with public institutions since the responsibility would fall on all parties, a collaboration is created, leading to a new term being adopted, collaborative governance where Collaboration is identified as how public organizations work with different entities, encouraging the involvement of the public such as the citizens, the private businesses and organizations to be involved in policy making, decision making, implemented measures and services created. This process considers the stakeholder's needs and requirements and focuses on what is important to reach mutual goals (Morse 2007).

Having citizens that feel empowered and informing them about what is happening and encouraging them to join in the decision making to achieve a form of partnership has increased the idea of collaboration. Creating collaborative governance processes has allowed governments to move away from complex and traditional bureaucratic limitations towards more open coordinated and collaborative forms of inter-departmental communication and transactions. With Collaborative governance managers seem to take more than nee role and get involved in many aspects of management encouraging collaborations of all departments which mean being more qualified. This also forces management to be accountable and in doing so being involved allows them to make the proper decisions. (McGuire 2006)

To achieve collaborative governance there should be trust and direct communication between parties, this is very important in creating a balance system of ideas and decisions to achieved a shared aim. Other than that, there should be commitment from both public and private sides, which would motivate both to participate equally (Ansell C, Gash A 2008).

Governance that focus on the business and financial aspect of an organization can be explained by the following types, which consider that governance is important and needs to be applied in the financial aspects of an organization and its surroundings.

IV. Corporate Governance

Throughout the 90s and early 2000s the concept of corporate governance was researched a great deal and the many literature was written on this concept.

The idea of corporate governance was suggested mainly to incorporate the link between governance and organization and its importance, focusing on finance. Due to conflicts arising between the finance departments and the owners of organizations, this concept

was provided to create a structure that can avoid any conflict of interest, as suggested by Jensen and Meckling in their 1976 journal, "Theory of the Firm: Managerial Behavior, Agency costs and Ownership Structure". This theory is considered a major breakthrough that it has been adopted by academic institutions in France and has been included in many of their economics and management curriculums (Charreaux G. & Schatt A 2006).

V. Financial Governance

The concept of Financial Governance is concerned with property rights, as provided by an article written by Jensen and Meckling in 1976. It is meant to help understand and clarify the financial structure in an organization for shareholders and management, and protect the interest of each without one overpowering the other. This structure helps differentiate between roles, positions, performance of the company, the effect of the market, managers, their input and other mechanisms that have an impact on the organization as a whole (Charreaux 2011).

VI. Environmental Governance

With the problems arising from Climate change and many other related environmental issues, comes the concept of Environmental governance or what is also considered governance for sustainable development. Since many parties are involved the need for a combined and clear structure is required, therefore the focus of this concept is on creating the proper governance structure or process that would benefit the environment and everyone else. And promote cooperation of all parties (Söderström S, Kern K, Broström M, Gile M 2016).

Having the participation of the public would provide a various number of opinions that are affected or involved with environmental issues and encouraging more people to become involved required better transparency, more encouragement in decision making and collaboration between government and the community. With the encouragement of

governments to listen to the public, this promoted citizens, NGOs and environmental organizations to voice their ideas. As a result, we find better theories, solutions and innovative initiatives being suggested and provided (Lemos M C, Agrawal A 2008)..

Then we should consider the effect of governance on a large scale and in general such as territorial governance and global governance that take into consideration all affected stakeholders involved, the policies applied, other governments global competition, and international cooperation. When governments consider developing or changing their cities into smart capitals, then all the city's policies, way of business, investments, citizens, natural resources and many other aspects are taken into consideration and considering what that city needs to grow and improve on is very important.

VII. Local Governance

As governance has the need to be clear and transparent and encourages participation and cooperation between stakeholders, when we talk about Local governance, we refer to the community and its local settings. Local governance is not just about provides various services to its local community encouraging communication between residents, supporting local businesses and improving their quality of living.

It is important for government official to directly and deliberately communicate and collaborate with the citizens. This concept is not easily achieved without the consideration of the territorial governance in the city that is mainly affected by decisions made, reactions and outcomes of policies and laws applied by governments (Divay, G & Belley, S 2012).

VIII. Integrated Public governance

The concept of Integrated Public Governance represents the policies and services provided to citizens who focus on what they need and what improves the quality of living which in turn can build trust between government and the community. In order to apply

this form of governance means that integrated strategies should be implemented, government officials' work on creating successful long term strategies that are in the benefit of the people, and work on improving public services provided to the people. (OECD, Integrated Public Governance n.d.)

In order to achieve this type of governance there should be a form of collaborative community engagement. Governments worked on single window service platforms to provide services to citizens which allows for better services, quicker replies and cost-efficient processes being employed. This term has become to be known as Integrated Service Delivery (ISD), with a large number of ISD organizations emerging, allowing for more collaboration between governments and citizens.

IX. Territorial Governance

With the many challenges governments face as a result of the increase of inhabitants in urban areas, creating the best-suited governance structures is very important. Yet, having to apply governance measures requires applying governance structures for the needed public policies each city requires, and this depends on the type of government and administrative structures followed. It is very clear that rural and urban regions cannot be easily categorized into specific titles and each have their own way of adopting and applying policies and innovative methods, as some might improve and advance while others many not improve just as fast.

To try and solve this issue, the Organization for Economic Cooperation and Development OECD was one of the first institutions that recognized the concept of territorial governance. This concept allows governments to find out what policies are more suited depending on the region and city, and allow them to better identify where their strengths and weaknesses are and work on creating the best-suited methods to use (Documentation 2001). Territorial governance is the creation and application of public

policies, procedures and strategies needed for the development of a territory depending on what it needs. To achieve this, requires five areas of focus:

The first step is being able to decide which players and institutions are needed to organize and deliver the territorial goal, how much knowledge about the territory do they need to have, is coordinating between them possible, and are the goals set achievable.

The second step involves integrating policy sectors to try and create a justification for using certain policies, this involves considering what policy sectors are needed to improve the situation at hand, if there are any sectorial conflicts, who is affected by this issue and if it is possible to resolve conflicts and achieve synergies between sectors.

The third step includes bringing together and encouraging stakeholder participation which includes making sure the right groups are involved such as the citizens, the businesses and policy makers and involving new groups and participants that would have some interest in the related issue as well as informing them of the governance method to be applied.

The fourth step highlights the need to be adaptive to the related situation or course of action and finding a way to encourage participants to be involved and flexible and open to adapting to new policies and changing situations

The fifth step involves understanding the territorial specifications needed and their impact in order to achieve the goals set. This involves defining the involved areas, considering the specifications needed to reach the goals required, the ways to utilize them, and the methods used to evaluate the effect of applying these policies (ESPON 2014).

The city of Milan is a good example of how territorial governance has a positive effect on creating more evolved and involved cities and areas. With the Province of Milan

introducing the Strategic Planning process, the "Città di città", the region around Milan has developed from an area where it was the main central city, to an area made up of a network of cities and municipalities around Milan, working together. This process helped handle the result of external factors that affected the region around Milan and allowed the cities around it to reach a common vision with the central city. This led to a network of cities with independent entities, jobs and markets, while remaining part of a functional urban region, allowing them to feel like they are part of something and encouraging them to collaborate on different services such as transportation (Piskorz 2011).

X. Global Governance

As the world is turning into a global village and everything is becoming more accessible, and more interconnected, we find that there is a need to create a process that can control the major challenges that affect the world as a whole. Global governance was suggested sometime after the Cold War to provide a structure of rules and policies by major states on all factors that affect all global matters. In order to allow this global governance structure to be successful, we should also provide effective international cooperation. It includes bringing together associations, organizations, rules and regulations as well as the different processes that are followed and creating a framework that can allow States to have a system of effective and predictable process that would help other states and countries, properly use their resources, increase goals and decrease their inequalities, while allowing them to stay independent.

Some areas to consider when discussing global governance include, understanding the differences between countries, their cultural and historical backgrounds, their available resources, and their responsibilities and existing policies and how each has its own way of governing. Then we should consider the subsidiaries, as levels that can solve problems that do not need to be dealt with in a major international level to allow for more important issues to be examined. When handling global matters, being transparent and inclusive of all the decisions and policies created and considered is very important as well

as being accountable for the decision-making process developed and applied. Another point that needs to be considered for global governance includes coherence, being able to create policies and make decisions that benefit countries and not provide any conflict of interest or create animosity between states and instead encourage cooperation between them. And finally, global governance should follow a process of responsible sovereignty in which States understand and respect other countries and their way of authority (UnitedNations, Global governance and global rules for development in the post-2015 era 2014).

When it comes to governance, we have so many areas of focus and so many insights into how cities and countries should be governed. In order to consider governance as a practice that can be followed, we need to understand the different principles that allow this system to be fair, provide the right decisions and steps to follow, and is in the interests of all existing stakeholders, which will be explained in the following paragraphs.

4. Principles of Governance

Our thesis discusses the different concepts and elements that are found in a city and that can help in improving and creating a form of utopian community for people, and as cities are moving towards urbanization, we find that existing governing body needs to be upgraded in city structures and administrations.

Having a structure that can distribute tasks, clarify each role and responsibility, review each project, define what is needed and what steps need to be followed is a vital form of organization that all decision-making bodies and management and governments need to take into consideration. We have focused on the importance of governance because without governance many projects, as successful as they can need some form of framework to follow and each city as tradition and systematic as they can be, need a governing structure that can clear what is needed to be done and how.

To summarize the different definitions and understandings of the term Governance, we should consider in addition to the various opinions provided by many organizations and publications and institutions, that the word governance originally comes from the Latin word *Gubernare* which means to steer (McRitchie 2014). It is mainly the supervising tool, such as the Board of Directors that steers and watches over the implementation of administrative systems and department and ensures that they are efficiently and effectively applied in the appropriate places and using the proper procedures.

There are a number of Principles of good governance that have been considered that help steer governments in the right path relating to what their needs are, they include, Accountability, Participatory, Transparency, Rule of Law, Responsiveness, Effective and Efficient, Equity and inclusiveness and Consensus Oriented. Many organizations focus on some, but not all, of these eight elements, even though they are all somehow connected to each other. But what most of these organizations have in common include, *Accountability, Transparency and Participation* that focus on certain aspects, mainly related to what each country's needs are. These three principles are linked together and make out the key factors that affect good governance.

When we talk about Good governance we start with Participation, where citizens need to be involved in the decision-making process, and their opinions and ideas need to be heard. Therefore, in order to encourage people to get involved, governments have to be accountable for their action, another trait of good governance, Accountability. For accountability to be applied the legal framework of the government should be independent and not corrupted, protecting human rights and minorities and enforcing the law properly, this is named the Rule of Law, and with this comes Transparency, providing information in a transparent, understandable and free form.

Good governance also means that governments should be Responsive, and be able to respond to any crisis as soon as possible providing quick solutions to avoid any situation growing more than necessary and being able to find a common ground and Consensus in

all applied decisions that suits everyone, and this means **Inclusiveness**, involving all stakeholders and applying **Equity** and fairness in actions when taken. And finally, for governments to apply all these factors, they should consider the needs of the people and should develop and create **Effective and Efficient** services, institutions and establishments that achieve that.

I. Participation

Citizen participation is considered an important key element of good governance. Participation includes allowing citizens to be involved in public issues, informing the public, keeping them involved in decisions and policies and answering their questions. As well as answer to their feedbacks and complaints by assuring them they will take them into consideration and work to improve services, or implement the suggested ideas and decisions with clear justification on why they did or did not apply them (Mas J.T, Diez A.A, Martínez M, Pagán J 2013).

Participation can be direct by directly informing the people of what they need to know and communicating with them. And participation can be indirect, where there are usually organizations that help get the people's voice heard, they could be charities, civil societies, organizations, associations and activists groups that hold the government accountable for their actions (IFAD 1999).

As governments provide citizens with information and access into their authorized data and records and planned policies, they should take responsibility for what they provide. When governments are accountable for their actions this process encourage the public to trust the government and allow for more involvement and participation in public policies, community ideas, and decision-making (Mas J.T, Diez A.A, Martínez M, Pagán J 2013).

II. Accountability

Governments and leaders have to be accountable for information, data, policies, decisions and all related projects conducted and implemented or provide to the

community. They should be responsible for any consequence that arises, and responsible to how these actions affect the community, stakeholders and citizens. With being accountable also, means governments and officials accepting sanction or punishment to wrongful actions conducted and taking full responsibility for decision made that have negative effect of their cities (Mas J.T, Diez A.A, Martínez M, Pagán J 2013).

Being accountable makes governments aware about what they inform the people and how they apply policies and practices knowing that they will be accounted for every act conducted. Governments should justify their reasoning for applying any act or policy to the public and in the event that no liable explanation is provided, the people can request sanctions to be implements on the officials responsible.

III. Rule of Law

Having good governance means having a system of enforced rules that are made out of fair legal frameworks that are followed by governments, highlighting on human rights and fairness while protecting the decision-making body and the actions they take (OECD, THE OECD CHAMPION MAYORS FOR INCLUSIVE GROWTH INITIATIVE 2017).There should be a legal framework that is clear and is against corruption and cannot be bribed with an unbiased judicial system and with a police force and protection service that follow the law.

As the United Nations view the Rule of Law, it concludes that all stakeholders involved including the government itself should abide by the laws that are publicly announced, and that are enforced properly and should always be applied and maintained in a consistent manner while taking into consideration the people, human rights, fairness in applying the law and accountability to the law, with clear and transparent ways (UnitedNations, Good Governance & the Rule of Law 2015)

IV. Transparency

Transparency is one of the key principles that are required for good governance. Having transparency means providing access of data to the public, implying a sense of trust, openness communication and joined relationship between governments and stakeholders. The absence of information or access to it could lead to distrust and disempowerment therefore providing citizens with the information that will allow them to feel involved, and understand what services and benefits they are entitled for and are receiving with as well as the policies applied by government, encouraging them to be willing to participate. Allowing citizens to be part of the policy formation can provide better insight into the type of governance practices implemented and on way to improve them. Transparency also affect government policies and behavior, knowing that their information is open to the public will make them provide be self-aware of all services and activities they provide as well as allocate resources in a proper way that is aimed for the benefit of the community and citizens (Report n.d.).

It includes access to documents, openness, citizen participation, disclosure of contents, active information policies implemented, administrative simplification. The European Union, provides its own view on transparency, as indicated on its website in its glossary of terms “transparency (access to documents) means “wider access to information and documents, as well as for greater involvement in the decision-making process” and better legibility of the texts (Mas J.T, Diez A.A, Martínez M, Pagán J 2013).

V. Responsiveness

In order to have Good governance, governments should also be responsive to the people’s needs and be able to provide the right public services within the needed timeframe. How the government responds and how it listens to the citizens is also considered important, listening to people’s complaints and trying to provide them with the most efficient and effective type of services and being responsive in delivering the needed services while providing them to everyone in an equal and fair way.

This type of service delivery is another form of good governance where governments try to show how much they work for the people, which are beneficial in many countries especially in countries that lack proper polices and initiatives (Abrha 2016).

VI. Equity and inclusiveness

Good Governance is vital in ensuring that all stakeholders are involved and do not feel excluded regardless of the stature of the stakeholders. The sense of inclusion encourages people to work as one, regardless of their ethnicity, their religion, or their background. When all parties feel that they are involved and are part of something then they will work on achieving the same goal and work on improving their living environment.

Providing a sense of Equity and fairness and having a transparent form of governance is required for the community to work together without any group of people feeling left out (Abrha 2016).

The OECD is one of the organizations that has worked extensively in promoting Equity with many of the governments under the OECD have worked on eliminating discrimination and providing equal opportunities to minorities, promoting equality in workplace, healthcare, education and many other areas. (OECD, Government at a Glance 2015) In the United Kingdom for instance the, the government enforced the Equality Act, in 2010, that requiring businesses to not discriminate between males and females, equal pay, people with disabilities, people with different skin color and such. (EQUALITY ACT 2010).

VII. Consensus Oriented

As there are a lot of stakeholders involved in a state or country there should be a form of negotiator that makes sure there is a consensus in all applied decisions that is in the best

interest everyone. Good governance should be able to mediate between stakeholders to achieve this consensus as well as have a long-term vision of what is required to maintain the sustainable goals set by the government in accordance with what the community needs and has (Abrha 2016).

Being able to reach a consensus between governments and their communities would provide a more simple and harmonious collaboration between the two. In order to achieve this, agreeing on essential factors is the best option for government, within the target of improving their communities and following through on what they agree with their communities on. In addition, governments need to provide association that can mediate between them and the citizens in unbiased and fair ways. (Hillenbrand 2004)

VIII. Effectiveness and efficiency

Then we have efficient and effective governance practices. The efficiency of governance is vital in all areas of a government's administration. As governments work towards improving their cities, they need to understand that without effective methods and efficient measures, no organization can achieve its full potential. For example providing efficient public services with effective delivery reduces the need for citizens to over step and resort to illegal or unorthodox ways to get what they want, and with effective provisions applied many problems that might arise between governments and citizens can be resolved. (Kefela 2011)

Another area of focus for efficient and effective governance is using the city's resources in an active and resourceful way to achieve the needs of the city and community while protecting the environment. This are can include adopting the right investments and plans in the right places and the right way as well as making sure that the services provided to the citizens are efficient and of great quality (Abrha 2016)

5. The different views of Good Governance

Even though not one specific definition has been given to governance, many organizations have provided their take on governance, and it is seen that most of them have several principles of governance in common. The principles mentioned earlier are considered as factors that represent the ideal path good governance is comprised of, and even though various organizations believe that these principles are important, they focus on certain factors more than other.

- The **World Bank** considers that the factors that affect good governance are participation of citizens, accountability of the governing body for all aspects and polices implemented, as well as political stability and absence of violence to provide safety for the community and encourage more investment and collaboration. It is important to have a regulatory system that hands all problems that arise and control all sections of a city and following the rule of law is vital by all stakeholders involved and fight any corruption internally or externally (Mas J.T, Diez A.A, Martínez M, Pagán J 2013).

- The **International Development Association (IDA)'s** choices of the main principles of governance focus on accountability in the financial aspect of a city's resources, expenses, cash management, health services and education and all issues relating to living standards of citizens. Transparency of investment decisions, government plans and considered policies and corruption control. IDA also considered a fair and stable legal system is needed with a clear idea of rules and regulations applied. Then there is participation of citizens in decision making, as well as in the design and application of policies and projects to encourage collaboration and commitment (IFAD 1999).

- **The Asian Development Bank (AsDB)** suggests the elements that define governance to include Accountability of public office decisions and evaluation of their economic performance as well as participation of stakeholders in decisions on projects and implementation process. Other areas of focus include predictability, it considers

policies and laws should be clear and followed to the point with clear predictable action developed under any situation that arises Then there is transparency of information to the public on all rules and regulations applied as well as information (IFAD 1999).

- The African Development Bank (AfDB) governance focuses on five elements, Accountability being accountable for how public assets are being utilized and how successful governance practices are. The second characteristic required for good governance is being transparent, and government policies should be publically available for citizens and stakeholders should be encouraged to participate in decision-making. Good governance should fight corruption and fight personal gains from public office with a clear and proper legal and judiciary system (IFAD 1999).

- In the opinion of The United Nations Development Programme (UNDP) requiring the right processes and applications for citizens to get their opinions and needs to be heard and considered. Governance was characterized with Participation in decision-making, with freedom of speech. Rule of law in which all laws and regulations should be enforced in a fair and legal way supporting human rights. There should be Transparency, providing free information and allowing easy access to needed information. Governance should also be responsive, serving all stakeholders equally and should provide mediation and be able to reach a consensus on policies and procedures that suit all parties. Another point the UNDP considers important is Equity providing equal opportunities for both males and females. Governance should also be efficient and effective and decision makers should be accountable to the community and stakeholders at all times. Governance includes having a vision that needs to be achieved without compromising the cultural and social existence of the city and working on achieving this vision using good governance (IFAD 1999).

As it will be seen later on in the thesis, the points mentioned above on good governance are also included in the tool the thesis is focusing on, from participation to accountability to

responsiveness, to transparency, as well as equity and inclusiveness, and effectiveness and efficiency. Having good governance is vital for cities and communities and applying the right principles properly would allow them to achieve their initiatives and improve their services successfully.

7. Chapter Summary

For a city to function it should have a managing of administrative structure that it follows, this form of structure is described as governance. In order to understand the need for smart cities to function properly, this chapter explains the start of governance, mentioning a few types of governance concepts that have risen in past years and the main factors that need to be worked on and elaborated to produce the best level of governance a city would need.

Understanding that there are many types of governance structures, is very important, considering that some are focused at the communication and control given to shareholders in behavioral governance, as well as there is collaborative governance, specifying that all stakeholders should be involved whether in decisions, policy making, implementation and being informed continuously. And when working on businesses and financial aspects, governance also plays a role, we find corporate governance, to reduce any conflicts that might arise between the finance departments and the owners of organizations, which also leads to financial governance, which helps understand the financial structure in an organization for shareholders and management, and protect the interest of each without one overpowering the other.

Then the chapter focuses on areas related to climate change the need for community participation in sustainable development using environmental governance. and a few other governance types that are explained in more detail that include local governance and territorial governance, as governments need to understand that in order to adapt and handle communities, then all the city's policies, way of business, investments, citizens, natural resources and many other aspects are taken into consideration and considering what that

city needs to grow and improve on is very important. This point focused more on territorial governance as it provides a better understanding of the steps required to encourage participation, understand what the territory needs, how to implement the right strategies and what steps need to be followed. Then there is global governance, which might not seem relevant but when you consider the importance of globally intervention, and involvement in an area, as well as the need for cities to compete with their global neighbors and markets, it is clear of the importance of global governance.

As our thesis discusses the different concepts and elements that are found in a city and that can help in improving and creating a form of utopian community for people, and as cities are moving towards urbanization, we find that existing governing body needs to be upgraded in city structures and administrations. When we talk about Good governance we start with Participation, where citizens need to be involved in the decision-making process, and their opinions and ideas need to be heard. Therefore, in order to encourage people to get involved, governments have to be accountable for their action, another trait of good governance, Accountability. For accountability to be applied the legal framework of the government should be independent and not corrupted, protecting human rights and minorities and enforcing the law properly, this is named the Rule of Law, and with this comes Transparency, providing information in a transparent, understandable and free form. Good governance also means that governments should be Responsive, and be able to respond to any crisis as soon as possible providing quick solutions to avoid any situation growing more than necessary and being able to find a common ground and Consensus in all applied decisions that suits everyone, and this means Inclusiveness, involving all stakeholders and applying Equity and fairness in actions when taken. And finally, for governments to apply all these factors, they should consider the needs of the people and should develop and create Effective and Efficient services, institutions and establishments that achieve that.

This chapter provides the opinions of several organizations on the different principles of good governance. The World Bank considers that the factors that affect good governance are participation of citizens, accountability of the governing body for all aspects and polices

implemented, as well as political stability and absence of violence to provide safety for the community and encourage more investment and collaboration. The International Development Association (IDA)'s also considers the importance of participation, transparency and accountability in the financial aspect of a city's resources, expenses, cash management, health services and education and all issues relating to living standards of citizens. The Asian Development Bank (AsDB) consider accountability of public office decisions and evaluation of their economic performance as well as participation of stakeholders in decisions making, and that policies and laws should be clear and followed to the point and of course transparency. To The African Development Bank (AfDB) governance focuses on five elements, Accountability, transparency, participate in decision-making and good governance should fight corruption. Then there is The United Nations Development Programme (UNDP) which considers the importance of participation, rule of law, transparency, equity providing equal opportunities and decision makers should be accountable to the community and stakeholders at all times.

In the course of the implementation of good governance, finding ways to encourage participation and promote transparency has made cities look for different forms to achieve that. Implementing effective and efficient services, trying to become responsive, and working on equity and exclusiveness means working on ways to communicate and collaborate and solve problems in a quick and efficient manner. In order to improve their services and their environments, is forcing cities to work beyond policy, departmental and administrative changes, in following with world trends and solutions, cities are adopting smart techniques, smart solutions, smart projects and smart governance. Therefore we have seen a huge rise in the amount of cities that have labeled themselves as Smart Cities. Adopting smart initiatives and implementing smart solutions has opened cities and brought them into the modern age of technology and digitalization and has allowed many challenges that cities had previously faced to be handled and corrected properly, as it is elaborated in the next chapter.

Chapter 3: Smart Cities Typology & Criteria

Governance has become a huge part of city structures. For governments to grow and expand, creating the right type of governance means providing a framework that answers to what their city needs, and in order to apply this framework, we find smart solutions have been adopted and implemented in many areas. To understand how Smart Cities are emerging and the different application required to aid in this concept, we need to consider the elements and components needed in detail that can allow Cities to improve, and develop themselves.

Cities are required to focus on various aspects of living, providing less congestions, better traffic systems, air quality control, better job opportunities, sustainable living, data transparency, investment opportunities, better housing and healthcare and education. These factors are all required when considering how advanced cities are and in viewing these aspects we can understand how cities differ from each other and what factors need to be more focused on.

We are going to view the different concepts created that define cities and how focusing on certain areas can differentiate cities from each other. Then we will focus on the different components that smart approaches are applied on to improve cities.

1. Overview of Smart Cities

In the past decade, the World has seen an increased shift towards industrialization, with an increase in urban migration. With more people wanting to live in cities, this move would have a great impact on areas such as policy implementation, various social and organizational problems greenhouse effects, waste management, scarce resources, air pollution, health concerns, traffic congestions, and aging infrastructures that is why creating an approach to manage these challenges has become a major issue to many governments. This unplanned development of cities and their lack of preparation in welcoming such a huge number of dwellers have resulted in major challenges for governments, administrators, architects and

urban planners. As a result, cities have had to improve their networks and services to keep up with the increased migration and needs of the new inhabitants, and in order to do so cities had to introduce different approaches into their services. This new approach has come to be known as the *"Smart City"*, introducing technological, advanced and innovative methods to handle these challenges. (Chourabi H, Nam T, Walker S, Gil-Garcia J, Mellouli S, Nahon K, Pardo TA, Scholl H 2012).

The theory behind Smart Cities is still not clear and no specific definition has been adopted to explain it yet. But the theory of smart cities was introduced as technology emerged as a result of finding ways to incorporate the new technologies with solutions for challenges cities were facing, considering way of how information technology can improve government services, or increase investment or solves poverty issues, and how they can be applied in waste management systems. (Batty M 2012) The basic idea of Smart Cities is that it is where a city's networks and services, with the use of technology and advanced communication and digital systems and the application of several other concepts, are transformed from traditional processes to sustainable and flexible networks and operations required by a community to operate properly using the existing resources it has (Mohanty S, Choppali U, Kougianos E 2016).

With creating Smart Cities, several concepts had to be considered and improved that affected all City operations. Focusing on these concepts is how many approaches and methods are applied to achieve the somewhat identified theory of Smartness in cities, which targets vital areas of a community from the government's administrations to the citizen's involvement in decision-making.

2. Definitions of Smart Cities

Smart Cities have been viewed in many ways by many researchers and each added their own view of what Smart Cities represent. For Harrison et al. "it represented instrumented, interconnected and intelligent city", while for Washburn et al. "smart cities involve the use of

Smart Computing technologies to make the critical infrastructure components and services of city-which include city administration, education, healthcare, public safety, real estate, transportation, and utilities- more intelligent, interconnected, and efficient". (C. Yin 2015) For Giffinger et al. (2007) and this will appear in the following section , the idea of smart cities was elaborated into having several dimensions, as defined by him, "A city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens" . Lombardi et al 2012, suggested that a smart city is defined by the "The application of information and communications technology (ICT) with on the role of human capital/education, social and relational capital, and environmental issues is often indicated by the notion of smart city". Another definition includes suggests that "A city is smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance", which was defined by Caragliu et al. (2009). (V.Albino , U. Berardi , R. M. Dangelico 2013)

3. Typology of Cities

When we talk about smart cities, we do not always consider the idea of technology as the only factor that makes a city smart. There are many characteristics that make up a city and distinguishing between them allows us to better understand the different types of cities that are starting to evolve nowadays and how these cities have different aims and goals that all lead to better quality of life.

Cities are considered smart according to what they provide their residents, from safe to affordable, to enriching quality of life. Some would consider applying technological advances while other would consider working on improving the environment and natural assets of their communities. As a result, we find that there are an increasing number of city types that are coming to existence.

I. Digital City / Intelligent City

Smart cities are also considered intelligent cities, that offer technology-based services and apply e-governance programs and have digitalized systems applied in almost all a city's governmental administrations. Intelligent cities use the data collected from automated systems and services to understand human behavior and human patterns. Intelligent Cities are also named Digital Cities, created with monitoring and data collection systems that analyze and gather data to provide the required information to its citizens. The Economy is digitalized in all sectors, including the tourism, retail and businesses and digital programs are implemented in all infrastructures, health and educational buildings and services. In a design thinking economy, we can see another factor of a digital city that involves collecting information from the data provided indirectly by residents and stakeholders

Analyzing the services provided is conducted using production structures and systems located near residents and consumers to collect information on the spending patterns and be able to understand the way citizens spend and live and provide services according to the information collected, a form of circular economy as it's a continuous cycle. Businesses are connected through networks and online services in what is considered as an online economy by itself, providing and gaining services and communicating online when handling and working on business transactions and collaborations. We find that city dwellers do not all abide by working timelines, of daily routine working hours, or office-based jobs, but working habits are different, with many working from home, or outside the office or through co-working.

In digital cities we find that the government already collects all the data it needs from our spending behavior, street control, road behavior, through devices which is a retrospective process. In a Prospective course, governments use Artificial Intelligence Tools to decide what the people want according to processed data. And in a perspective process

government apply what they want according to what they know, they can refuse payments, send invoices and even stop treatments as they see fit (Dupuis n.d.).

II. Sustainable City

Sustainable Cities are defined by the ability to sustain anything, and last longer under any situation. Several explanations have been provided to explain this type of city, such as the UN's view on a city that can meet the needs of today without compromising the need of future generations. (Maddox 2013)

Sustainable cities are mainly concerned with the environment and the use of natural resources and how they can improve the quality and standard of life in a city and in a global way while preserving the city's identity and natural resources. We find that sustainable cities encourage green living, encouraging the creation and maintenance of parks and gardens and management of green space and effective use of a city's existing natural resources. Other types of sustainable cities focus on integrating green living into residents' lives, in their homes, buildings, streets and such. Another type of sustainable cities includes resilient cities that focus on how cities can withstand challenges such as natural disasters or climate changes and how they can easily bounce back from such catastrophes (Cavada M, Hunt D, Rogers c 2017).

Other factors that define sustainable cities include, clean cities with efficient climate control, cities that have low levels of pollution or none at all, with low congestion, control waste management, and safeguarding the existing natural resources for future generations. (Delany n.d.)

III. Liveable City

The concept of Liveable cities is defined by maintaining the individual, social and environmental presence and wellbeing of the city and preserving it for future generations. It is not a specific term that applies to one type of city, what is considered a liveable situation in one city might not be for another, but it all depends on the city's

cultural situation, needs, available resources, and type of residents and several other related factors that define a city as liveable.

The concept is not just limited to having the basic needs of city dwellers, but in addition it provides a sense of belonging, cultural environment, safety and security and a better quality of life for its people. It is also found in the economic status and how stable it can be for its residents, the environmental positioning of the city which is considered the main infrastructure that allows a city to handle itself and the social factor which allows citizens to feel secure and in a fair and safe location (National Research 2002).

Liveable cities provide better ways of living for citizens that include affordable, safe, clean and reliable transportation, and prepared with different types of transport such as bicycle lanes, metro stations, safe streets and traffic congestion control. Such cities also focus on affordable housing that are environmentally friendly and neighborhoods that promote equity and safe living available for all types of people and ethnicities. Other factors of liveable cities focus on encouraging community development and enhancement, project funding and promoting economic competitiveness to attract investments and businesses that would allow the city's businesses to flourish. (T. Herrman, R. Lewis 2017)

IV. Utopian Smart City

This vision of a utopian Smart City creates a world of systematic and organized life styles that can solve and fix any problem that might arise. It is what most cities aim for and it is where most people want to live in. With an organized and coordinated system of transportation, hybrid and electrically charged vehicles in traffic-controlled streets and security cameras posted everywhere to monitor roads and streets and provide up to date information on traffic to citizens through mobile applications. This kind of city provides more than just a traffic free atmosphere, it also provides a clean quality of air as well as non-existent pollution or waste with properly distributed and monitored systems and meters and sensors that can automatically catch and default of leakage and can continuously monitor the climate and sewage treatment. As well as reducing the use of

electricity by using solar powered utilities, houses, businesses and lights with transparent and easy access to government information and data as well as the possibility of communication and complaint resolution provided by government official.

In addition to all the above a utopian smart city is environmentally friendly focusing on sustainability of natural resources and the well-being of its citizens with access to healthcare, water, electricity and all services that are required and considered basic human needs.

This kind of smart city provides the best business and investment environment for corporations and stakeholders and created a connection between organizations and companies in the global sense with expansion and job opportunities existing everywhere. The idea of having a utopian smart city provides a framework of living that most cities aim to achieve and is the bases to what governments want (Moyal 2016).

4. Smart City Characteristics

The vision of a Smart City, is more like a framework, a system using “Smart” ways, to enhance every section and dimension of a city to achieve modern urban development, which can vary from city to city depending on what they need and what they lack and the availability of funds, resources and willingness to adopt change for improvement. (Fisher D, Witters L, 2013) (Chourabi H, Nam T, Walker S, Gil-Garcia J, Mellouli S, Nahon K, Pardo TA, Scholl H 2012).

As suggested by Rudolf Giffinger, smart cities are categorized by six characteristics each with their own set of features. The balance of these characteristics is vital in understanding how a city functions, and they include, Smart Environment, Smart Governance, Smart Living, Smart

Mobility, Smart People, and Smart Economy. (Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., & Meijers, E. 2007)

I. Smart Environment

Smart Environment is a major factor as it is related to the environment and resource used, it focuses on using advanced solutions and technology to solve issues to protect the environment such as reduction in pollution, effective natural resources management, building renovation, applying green urban planning, reducing pollution, improving the efficiency of energy and creating sustainable atmosphere and protected areas. With urban congestion there is a concern of the ability to protect and effectively use the existing natural resources and the ability to efficiently control energy pollution, therefore the more a city is focused on providing a cleaner atmosphere and preserving and protecting its natural resources, the more smart it is considered. (Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., & Meijers, E. 2007)

The way Smart Environment is developed is through sensor networks (Wireless Sensory Networks WSNs) that can be embedded anywhere and used to track various aspects of the environment including Smart Homes, Smart Offices, Smart building and such. Some applications detect activity, certain natural disasters before they occur, various factors such as earthquake detection, monitoring of fire forest and the amount of various air pollution emissions such as CO2 and air pollution. Encouraging recycling, water consumption, waste control, energy efficiency and encouraging green buildings are all ways of supporting Smart Environments (El-Bendary, N, Fouad M, Ramadan R, Banerjeeet S, Hassanien A 2013).

Smart Environment ideas use existing resources as well as advances system to apply an innovative idea that can save, protect and reduce waste in the environment. One way this was applied is very simply creating smart “bins” in Seoul, South Korea (GSMA 2016). Having excess garbage flooding the streets because of the government’s waste collection reduction resulted in streets filled with rubbish that was unhygienic, unhealthy and

affected the city as a whole in both its appearance and atmosphere, which resulted in the creation of the "Clean Cube". The idea was to create something smart that can have multiple uses and at the same time reduce the problem of the existing and excess waste. What was created was a solar-powered garbage bin that compresses its contents allowing space for more than three times its original amount to be filled which helped allow for more space in them. This Clean Cube also included wireless connection that can communicate with the waste management when the garbage bins are full and need to be emptied which also meant a reduction in collection visits, and this idea involved the partnership with Vodafone that provided the network connectivity used in these bins that sends reports to their management about their status.

Smart Environment promotes green living and is aimed at the environment, nature and natural resources of a city, protecting the ecosystem and preserving the sustainability of the city's resources. Green spaces and accessibility of transport are an additional point in smart environments that provide recreational environments with rich cultural attractions, stimulating the feeling of belongingness and allowing communities to collaborate together as one.

Governments should be able to protect their resources and water reserves and lands, eliminating the existence of sewage leakages and waste damages and providing solutions that can face floods and other natural disasters, promoting solutions that affect climate control, working on introducing projects that encourage green space allocation and utilization. Additional factors include, focusing on housing and infrastructures and way to improve the industrial footprint in a city's surrounding that do not exploit the environment, in addition to using and adopting recycling systems and projects. (Kumar V, Dahiya B 2017).

II. Smart Governance

With all the smart concepts provided above we come to smart governance, as we have noticed all concepts are linked together to achieve synergy between each area that is

connected by a major body of management to help achieve the purpose of the implemented initiatives or projects that have come to be applied in cities. In order to apply and maintain the proper form of initiatives and make sure that they are followed in an appropriate path towards achieving their goals we have to have managing body that can provide the framework to be followed, which includes promoting political participation and improving the government's administrative system and the services provided to the people. This includes becoming more transparent and open with citizens as well as refining and modifying policies and laws to cater to people's needs. (Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., & Meijers, E. 2007)

Smart Governance is concerned with the citizens, the government or city as a whole and the communication aspect between both entities. It employs smart methods and digital technology to create an efficient management structure that can apply smart organizational features and legal practices to make better decisions and deliver innovative and planned services to citizens. It also includes producing and delivering new public services to improve quality of living, as well as apply different forms of methods to encourage data exchange, communication and collaboration between government and citizens through transparency and data sharing. Smart Governance encourages citizens to participate in the decision-making process allowing for more productive and unified decisions and policies being implemented. With social media and social technological advances such as smart phones, data sharing and information exchange is easier and this allows citizens to know what is happening and be informed all the time. Citizens are in the know, at all times of ideas, policies and innovative initiatives that are being suggested, implemented and considered, which in turn allows them to be part of it, give their opinion on related points and join in the creation and development of smart applications and policies.

Even though the idea of smart cities rose more recently but many cities have been applying smart initiative to improve their cities decades ago, such as the city of Curitiba capital of Parana in Brazil. This city is known for being the first sustainable city in the

world applying innovation that transformed it from an agricultural space to a city since the 1970s with the vision and governance application of Jaime Lerner who became mayor of the city. Creating a governance structure that involved the citizens, land, transport and natural resources the city was transformed into one of the greenest cities in the world that solved the continuous flooding problem that the city previously faced by creating green areas that surrounded the city filled with livestock that was also used to enrich the economy with wool selling. Another major enhancement to the city that involved affordable and cleaner transport, gas emission and citizen participation and collaboration included the BRT (Bus Rapid Transit), created, convincing people to ride bicycles and buses rather than use their own vehicles. Another process that involved smart governance and involving people involves waste management; by encouraging citizens and even children to recycle in return for reward schemes, such as bus passes, school supplies and such (Alexe 2017).

It highlights the importance of accountability and responsiveness and transparency by working on communication and continuously improving the e-governance systems and service delivery to meet the needs of their citizens. It encourages participation and stakeholder involvement and collaboration in policy making and decision-making processes and implementations of projects. In addition to being inclusiveness and fair in their applications, and enforcement of rules and policies and services, smart governance promotes sustainable planning and application of effective urban management systems that have a lasting effect on the environment (Kumar V, Dahiya B 2017)

III. Smart Living

Smart living uses smart technologies and intelligent network to control the daily life of an individual and allow them to control their personal environment to make living comfortable and convenient in all its aspects, from turning on the lights up to paying for a parking space before reaching the parking lot, all through the use of smart electronic devices. Governments can also provide better services to citizens for better quality of living such as promoting smart health services for people, providing safe environments

with smart technologies, improving educational facilities and even cultivating touristic attractions. (Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., & Meijers, E. 2007)

Smart living can be found in all locations such as home, transport, the office, buildings infrastructures, streetlights, touristic attractions, educational facilities and such, and applying solutions and applications to them are created to improve the quality of life. Smart living involves technological adaptations, sensory networks, data analytics, engineering concepts, communication, and many other ways to achieve this comfortable, easy access, user friendly, form of living, that affects health conditions, safe environment, easy transport and parking, home comfort and quality, and facility access. Smart living allows for safe way of living, comfortable easy access to everything around, with simple effort required and can encourage healthy living and achieves good quality housing and accommodation. (Kumar 2018)

Smart Living is found in many places, in educational institutions, offices, and even homes. A Smart Home is created to provide a better way of life, allowing the person to have everything right under his fingers in connectivity, control, visual observation and comfort as household appliances and interaction with home devices has increased, providing easy access, convenience and comfortable ways of living. One example is the Samsung SmartThings system which can be connected to several devices in the House, from light switches to electrical devices, camera, TVs, even answering the doorbell and can be easily accessed using a smart phone, allowing a person to control his home from far, watching the inside of his home and even locking or unlocking the house and can even follow voice commands. (Ibarra 2017)

Smart living also considers the importance of community, culture and heritage, it promotes shared values throughout the community. Projects related to smart living focuses on the individuals, the seniors, the children, and females situations in an effort to

provide a fair and equal opportunity and safe environment to all resident. (Kumar V, Dahiya B 2017)

IV. Smart Mobility

Smart Mobility is another important characteristic of smart cities. Governments have worked hard in preparing their cities for the increased amount of residents that have moved into them. One aspect to consider in easing this process is providing easy mobility services through accessible means and methods, and using ICTS to achieve this is the only way to create these Smart mobility solutions. Creating methods such as transport systems, whether for pedestrians, for vehicles, for larger transports such as trains or airplanes and creating processes or systems that would help increase transport, provide better air congestion, assist in travelling to avoid traffic problems, and even assist in parking will achieve a better level of city safety, cleanliness and transport management. (Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., & Meijers, E. 2007)

When applied properly Smart Mobility solutions can help reduce CO2 emissions, reduce traffic congestions and travel assistance. Creating transport sources that allow citizens to use such as GPS navigation system, creating pollution-controlled vehicles and many other examples have helped cities work on becoming safer and improve the quality of life of t their communities. (Docherty I, Marsden G, Anable J 2017).

Some examples of Smart mobility include the creation of hybrid cars that have helped in the reduction of car pollution, to help the environment, then there are the introduction of bicycle lanes and encouragement to use bicycles, to encourage health and environment awareness. There are also speeding control systems that include sensors, cameras and other ICT components to make the streets safer as well as parking systems for citizens. (Benevolo. C, Dameri. R, D'Auria. B 2016).

There are several ways that Smart Mobility can be implemented in cities to allow for better services, less congestion and more efficient approaches, other than helping

provide better air quality and pollution reduction. Some smart suggestion that have already been introduced or are under consideration include for example applying Traffic Management systems that can calculate and provide the timing of traffic light to match with the demand of traffic at the right time. These systems can also control bus schedules and calculate the time that buses will arrive, whether they are delayed to be consistent with traffic light turning green. Another idea is distributing CCTVs all over the city where traffic congestion is extreme and where traffic lights in general are posted. The use of CCTVs at intersections aids traffic control agencies to predict traffic, congestion, be notified of collisions and other causes of pileups. Combined with good communication systems with traffic control agencies, the police and road users such as bus drivers, airports and metro stations, such systems help information to be transmitted on time and to the right officials in advance to give them time to correct any rising issues (Transport 2016).

As more online services are being introduced, we find that more deliveries of products, packages and ever groceries and food seem to take over many streets. Creating redistribution stores or warehouses that are closer with a shorter transport time needed to deliver goods is a new suggested idea to help empty the streets from gas emission vehicles. Governments have also applied driving polls or road pricing on certain areas that are considered already pollution affected to help reduce the gas emissions in these areas.

Other smart mobility solutions would be encouraging cycling, improving cyclist's lanes and infrastructures with reduced junctions that are potentially dangerous for pedestrians and cyclists. Encourage the use of bicycles by providing easy access, easy lanes and easy cycling roads and parking spots. Other ways to reduce the use of vehicles can be by encouraging the use of buses. For example, by introducing free Wi-Fi, transport services people are more encouraged to ride buses, as studies have shown that people most view their mobile devices while onboard public transport. In addition, this system can allow for information about public transport passengers and the collection of relevant information to be easier Metro stations and railways are other examples of transport that seem to be

used by many countries and have been adopted in cities in the past years. This large transporting system can transfer a huge number of people from one area to another reducing the level of vehicles and individual transport (Ferrari 2017).

V. Smart People

A Smart City cannot be complete without the individuals it aims to be made for and in order to succeed these individuals have to be able to adapt and live in that kind of smart world, that is why it is important to have what is considered as Smart People.

In this sense, Smart People means individuals who are responsible, educated and qualified, who have a drive for continuous advancement and learning, open to different cultural differences, which are flexible and creative and open to new ideas and improvement. These kinds of people are what will shape smart cities, with their participation and involvement, and their ideas as well as feeling of community and applying their skills and talent of what is best needed for society as a whole. It is not about the educational degrees they have but rather about their interaction with their community and their government. Even though Smart Cities encourage citizens to become more involved, the need to have citizens to reciprocate that effort is even greater. (Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., & Meijers, E. 2007)

One way in which the importance of having an educated open-minded community has been proven in Seoul, Korea. With the increase in industrialization and increase in number of people moving into the city along with the economic decline, the need for sharing was the perfect choice. In 2012, the city introduced the Seoul Sharing City initiative, led by the city's Mayor, Park Won-Soon. This initiative is the first of its kind, allowing the city to become the number one sharing economy in the world, encouraging many other cities to adopt this idea. The concept of the Sharing initiative is encouraging the sharing of things, exchanging of this through connected links and other means. It covers everything from individuals finding rooms leasing and sharing rooms, whether a

college student looking for a place to live or an old man with extra space in his home to sharing parking spaces. It also includes sharing meals, exchanging clothes all provided with online platforms such as Kiple and Zipbob (Guerrini 2014).

This initiative is the perfect example of how open citizens should be to improve their city, which have allowed for citizens to stay updated, alert, and provided a form of communication, need and commitment ,and apply the modern technological innovations to this process (Johnson 2014).

Smart people can be achieved by better educational systems, involving citizens in policy decisions, allowing them to understand them and the need for these innovation ideas and advancements and education people of the idea of technological operations products. Smart People should be able to be ICT skilled, with Smart ideas and technologies being implemented, citizens should be able to handle these advancements and be prepared for them and for future advancements.

The concept of Smart People is composed of individuals who are educated, who seek higher education, better healthy lifestyles, more open to global matters and opportunities and more involved in their communities and sustainable planning. Smart people pursue opportunities and face challenges by constantly searching for solutions of way to improve their lives and their surroundings and are open and flexible to new ideas and strategies. They are usually more, who are experienced, more educated, more knowledgeable and have high levels of qualifications and experience preferring continuously seeking higher educational degrees. (Kumar V, Dahiya B 2017).

VI. Smart Economy

Smart economy, is another vital point of Smart Cities. It involves the application of people's knowledge and skills in creating products and ideas and implementing them in the right places using the existing resources to develop innovative programs and solutions, integrating international markets and providing creative and innovative

services. To apply Smart Economy principle, means finding strategies to achieve global competitiveness, economic challenges, economic growth and allowing the city to become globally attractive. (Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., & Meijers, E. 2007)

These points are required to attain more business ventures, attracting investments, encouraging entrepreneurs, tourists, job opportunities, even residents and international expansion are goals that need to be considered (Kumar V, Dahiya B 2017) as well as encouraging competitiveness in economic markets, both locally and globally, all achieve economic growth (Tahir Z, Abdul Malek J 2016).

Using ICTs in all economic activities is very important when considering any aspect of Smart Economy. Smart economy concept aims for and shows high ability to transform the Smart City's economic activities, therefore, for a Smart City, focusing on Smart Economy means that we create a long-term vision that encourages and supports and enriches the civil society, public and private sectors, and other relevant stakeholders. It also involves applying innovative programs and initiatives that encourages competition, collaboration, and the growth of a city's agencies and establishments (Kumar V, Dahiya B 2017).

The economy needs to be an attractive place for people to want to come to this city, whether culturally or touristic reasons, applying creative and innovative ideas that can lure people into coming is an important aspect in Smart Economies. For this reason, we find that smart cities aim of global competitiveness not just in businesses but in innovative touristic attraction and cultural uniqueness that they try to advertise. This is the reason why such economies focus on local businesses and local environment and markets as well as internationally, because with the right attracts available in their cities, they can easily compete with markets and cities abroad. The areas of economic development are not just limited to markets or businesses but also to heritage, landscapes, architecture, brand creation, sustainable environmental planning and such factors (Kumar V, Dahiya B 2017).

Some examples of governments working on their Smart Economy strategies are focused on encouraging tourism, others involve improving their markets to encourage investments and then there are countries who focus on entrepreneurial start-ups and working on encouraging young or new agencies to start up. Such initiatives include Start-Up Chile, (Chilecon Valley), a startup accelerator completely funded by the public adopted in 2010, which makes it the first in the world. This initiative concept was aimed at improving the economy by encouraging startups, and focused on offering innovators a package including one-year visa, a fund up to $30,000, mentoring and training sessions. This initiative resulted in over 1,300 startups, where Chile put in up to $40 million to innovators from over 80 countries. By 2015, this initiative provided over 1,600 jobs and was funded by up to $100 million (Jiang 2017), (Egusa C, O'Shee V 2017).

5. Smart Cities Elements

In order to know what initiatives and approaches are needed is the main challenge that governments, the public sector, businesses and other stakeholders face. To be able to determine how to apply the most suitable approaches, eight elements are to be considered: Governance, Management, Technology, Policy Context, the Community, Economy, Infrastructure and Natural Resources (Chourabi H, Nam T, Walker S, Gil-Garcia J, Mellouli S, Nahon K, Pardo TA, Scholl H 2012).

When applying Governance, we create a framework that allows the management, structure, stakeholders and all individuals involved to have a clear idea of what they should do and how to go about it. It allows processes to be applied correctly and consequences when they are not followed properly. Having the right people and structure can only be successful if the individuals applying them are doing their work properly and are following their jobs correctly. Management should be accountable for

their actions and policies and socially responsible providing the right initiatives in the right places that are effective, environmentally friendly and promote better quality of living.

In order to apply these governance frameworks, management should work with advanced solutions and try to apply the best methods available and use the right approaches and technological innovations available to provide the citizens with the finest standard of life they can. Officials need to also take into consideration that applying new technologies or processes and trying to improve requires the modification and change of existing policies or creation of new policies that can be parallel to the course of implementing technological changes and innovative concepts.

When adding new technological systems and data collection sensors, programs and creating or modifying policies, we have to also consider improving our infrastructure to be able to meet with these changes and advancements and prepare them to the technological initiatives that can help cities and allow them to become smart. Using advanced technologies, ICTs, Wi-Fi networks and such, is another form of smart initiatives that would improve quality and services of a city. And with advanced technologies on infrastructures we focus also on natural resources as they are the main element in achieving sustainability, considering how in past years pollutions and climate control issues have risen, creating ways to preserve and protect what we still have is important in providing a better way of life of residents. And in order to have all these elements come together and prove how successful they are and be able to provide exactly what the citizens need we consider the citizens and the community as a whole. Encouraging cooperation and data sharing is a major key in promoting belongingness and making citizens feel like they are part of a community. And working on this community and developing ways to allow it to grow and expand is what encourages investment and growth. Having a smart economy increases economic competitiveness, encourages more entrepreneurs to development businesses and allows the community to expand to the global market.

Therefore, looking at each element in detail and how each one has an importance in what makes a smart city is explained in the following paragraphs. Even though a city's areas of improvement may be very wide, the elements mentioned in the following are considered the major areas of focus that change, improvement and development should focus on as they touch major parts of every city.

I. Technology

One dimension that is considered vital in Smart City is technology, and even though not one dimension can work without the others, many argue that Technology is the main factor for why cities are considered Smart. Using technology to improve the city standards is an important aspect in a Smart City concept in that Information and Communication Technologies (ICTs) are used in connecting to people, gathering data, and applying control on many factors in the city. Technology can be used to inform citizens about services and policies developed, created, implemented or provided and in return, it allows them to communicate their ideas, become involved, and participate in different policy development programs, services, as well as provide their feedback, and even voice their needs and concerns. The channels adopted for such exchange can be from social media platforms to online access platforms created for specific needs. As well as apply technology on administrative departments to speed up responses and communication and increase administrative processes. (Alawadhi,S, Aldama-Nalda,A, Chourabi,H, Gil-Garcia,J, Leung,S, Mellouli,S, Nam,T, Pardo, T, Scholl, H.J, Walker, S 2012)

In addition, technology is used to monitor, control and implement other smart initiatives and projects that allow smart cities to become advanced, in areas such as Transport systems, the government can control and monitor traffic congestion, control traffic lights, and even reduce causes of accidents. In other areas, technology can be applied on Healthcare programs, systems to reduce time to complete administrative paperwork processes.

II. Infrastructure

Applying smart methods on infrastructures and buildings or creating infrastructure using advanced technologies, ICTs, Wi-Fi networks and such, is another form of smart initiatives that would improve quality and services of a city. Infrastructures can involve all kinds of physical assets such as production lines, buildings, transport, telecommunication and many other businesses, and applying advanced technologies will allow data to be

communicated properly and increase the efficiency of services using existing infrastructure.

ICT infrastructures are mainly involved with sensors and networks that are distributed throughout the city, on buildings, residences and streets allowing for data and information, as the phrase ICT implies, to be collected and analyzed by governments. This information will allow governments to observe and monitor buildings, streets, traffic congestion, energy consumption, waste control, weather, climate patterns and provide the right answers, smart services and many other solutions that will allow a city to function better and become safer and cleaner (Colldahl C, Frey S, Kelemen J 2013)

III. Natural Resources

Applying smart initiatives on natural resources is another way that can benefit smart cities, as they are the main element in achieving sustainability. With the way natural habitat has been affected in the past years and the increase in pollutions and man-made disruption of the existing natural resources, it is important to preserve and protect what we still have. With cities becoming socially responsible and working on trying to remain green and environmentally friendly, by utilizing natural resources while protecting them from various natural challenges facing the world today, Smart initiatives are supporting this move towards a better environment.

Many areas are considered when we talk about natural resource challenges such as climate change, greenhouse gas emissions, water contamination, misuse of land, and many more and we find smart initiatives being applied in all related areas such as energy saving projects, environment protection measure, greener cities programs or going green initiatives that are becoming smart city goals. (Colldahl C, Frey S, Kelemen J 2013).

IV. Economy

Creating a smart economy will automatically boost the city's economic situation. Smart economy is achieved through investing in the economy, increasing economic

competitiveness, applying and encouraging more entrepreneurship developments and expanding to the global market. This process will in return attract more investments, achieve better markets, allow for more job opportunities and attract skilled workforce. (Alawadhi,S, Aldama-Nalda,A, Chourabi,H, Gil-Garcia,J, Leung,S, Mellouli,S, Nam,T, Pardo, T, Scholl, H.J, Walker, S 2012).

Areas that the economy can improve the smartness of a city include the image it portrays to other cities and other markets. Encouraging investment and providing lesser restrictions for new businesses and entrepreneurships and investment into the country would make the city more attractive to outside markets. Working on city tourism and landmarks can open the eyes into that city, more businesses comes with more tourism.

In other areas, employment can be increased with the help of new businesses and lesser restrictions, increasing considerations, working hours and considering individuals with certain conditions such as disabilities, maternity leaves and such and applying regulations and rules in their favor (ASCIMER 2015).

V. Policy Context

Modifying and creating a suitable policy context is another major aspect to apply smart initiatives, for both governments and the private sector. Each city has its own policies to consider, depending on its own requirements and people's needs. But they have to be effective and efficient policies, which in turn will determine how easily smart initiatives strategy implementation will be, such as removing legal constrictions in certain places to ease the implementation process of policies would allow citizens to be more open to change (Alawadhi,S, Aldama-Nalda,A, Chourabi,H, Gil-Garcia,J, Leung,S, Mellouli,S, Nam,T, Pardo, T, Scholl, H.J, Walker, S 2012)

For a city to advance and change, it has to modify, many of its policies which may affect many areas, legally and politically, even in the course of implementing technological changes and innovative concepts the result may not be pleasant if it is not done right.

Therefore, creating a smooth and easy process of implementation is necessary, thus having the right policy context applied. (Chourabi H, Nam T, Walker S, Gil-Garcia J, Mellouli S, Nahon K, Pardo TA, Scholl H 2012)

VI. Governance

Governance is generally a set of principles, rules, models and activities that can be applied for any governing structure or project. It describes the governing system of most governments, and the process of how they implement their laws, policies, rules and procedures to control and guide citizens and organizations, implement policies and communicate with other stakeholders, departments and citizens. Having good governance is very important to achieve accountability and transparency as well as encourage awareness, stability and participation of stakeholders in public issues and therefore a system should be applied that achieve a stable form of structure to be followed by governments and citizens.

All parts of a city's channels require governance, whether it was the government administration, transport systems, citizen participation initiatives, infrastructure, the use of natural resources and even the application of technological processes, it summarizes all the steps and procedures applied that a governing body needs from the start till the end of each process created (Smartcity 2017).

In order to apply governance properly, all parties should be involved, in governments of smart cities, all stakeholders of a city should take part in smart city initiatives and be involved in the decision making and policy implementation stages, as these projects are aimed towards improving cities and the quality of life of its stakeholders (Alawadhi,S, Aldama-Nalda,A, Chourabi,H, Gil-Garcia,J, Leung,S, Mellouli,S, Nam,T, Pardo, T, Scholl, H.J, Walker, S 2012). Therefore improving governance and implementing the right governance process is very important whether in administrative and departmental level of governments or by utilizing ICT technology to improve governance processes. (Chourabi H, Nam T, Walker S, Gil-Garcia J, Mellouli S, Nahon K, Pardo TA, Scholl H 2012).

VII. Management

For governance to be applied properly there should be an efficient organizational structure for the management of all the city's channels. Being able to take advantage of every aspect of the city and use it to provide the best services for the city is the main target of Management, that is why having an effective managerial structure that focuses on the city's interest, services and its citizen's quality of life is vital.

The right leadership or governing body is the key for a Smart City to succeed; it should also be socially responsible and accountable, providing the right initiatives that will achieve the best quality of life for the city is important. Management is also responsible for making sure that the initiatives applied are environmentally friendly and Information and Communication Technologies (ICTs) used are applied positively and efficiently (Mutiara D, Yuniarti S, Pratama B 2018). Their communication and collaboration with stakeholders is done with transparency and responsibility, providing data and information to the public, as well as encouraging citizen participation and involvement and their efforts should be aimed at providing sustainability of the city.

Management of Smart Cities can be one governing body or several governing departments that follow the specified governance structure. They can be a government department, a committee or an agency but they should all have the same aim, when it comes to Smart Cities. These governing bodies should be able to conduct their duties properly, follow the governance process provided and be able to work with other organizations and stakeholders to achieve the goals and targets the city has set for itself. As management, their responsibility is to observe and watch as initiatives are being applied and implemented and that the required governance processes are being used. (Alawadhi,S, Aldama-Nalda,A, Chourabi,H, Gil-Garcia,J, Leung,S, Mellouli,S, Nam,T, Pardo, T, Scholl, H.J, Walker, S 2012)

VIII. Community

One of the key factors in applying smart initiatives is the citizens and the community as a whole. Allowing citizens and the people to feel like they are part of a community, encouraging cooperation and sharing data and information is vital in creating a form of belongingness. Informing the people of the smart initiatives to be applied, and allowing them to be involved, creating awareness and allowing the people to participate, which would allow them to become active users and be more encouraged to adopt these initiatives. Involving citizens allows for the sharing of ideas as well as the giving of feedback, which is vital for governments to understand what the people want and need, and figure out how they can improve their services, and improve what they provide to the city.

Governments can communicate with citizens through various outlets and platforms, through social media, through mobile technologies and other smart technology channels (Alawadhi,S et al. 2012). Allowing citizens to understand what is happening around them and considering their opinion, needs and making them involved is a major step for cities in achieving better quality of living for their residents. In return, citizens will be more encouraged to adopt the new solutions and more willing to take part and apply more effort in making them succeed (Chourabi H, Nam T, Walker S, Gil-Garcia J, Mellouli S, Nahon K, Pardo TA, Scholl H 2012).

These concepts are related to almost every aspect of a community of city. It is important to understand that these elements have an impact on the way smart initiatives are evaluated. When assessing the success of a project there are certain factors that need to be tested, viewed and taken into consideration and when it comes to smart cities, observing and evaluating the impact and success of the technological aspects, the existing infrastructure, the application of policy context techniques does have a major effect. These also include the governance and management processes applied or formed as well as the community's engagement, the use of the natural resources and of course the effect on the economy. They all play a major role in the idea of smartness a city or

community implements. And for this reason, we find that in the case study provided in this thesis, these factors are considered and evaluated, and for this reason it was important to introduce these points in this chapter, so the reader has a clear idea of what a smart city requires.

6. Areas of focus of Smart Initiatives

Smart initiatives have been applied on nearly every aspect and corner of a city and there are many different areas of focus to consider when mentioning the different types of initiative applied. In general, not one specific way is required as a necessity for smart initiatives, but it depends on what each city needs and what its citizens require in order to provide the best quality of life for its residence.

When we talk about Smart Cities, innovative projects and smart initiatives that have been adopted or implemented vary from city to city according to its need and what areas that city is working on to improve. There are many areas of focus that have been employed in smart projects but in general several areas have had major focus on such as healthcare, transportation, infrastructure and a few other that will be mentioned below.

I. Security

Security is one of the main concerns of cities as more people move to urban areas the rise in crime and the need for more security has been an important concern for city officials, as well as control of natural disaster and fires and major accidents that can be avoided or if they occur, can be controlled.

With the use of ICTs, technological programs, systems, Closed Circuit Television Cameras (CCTV), facial recognition programs as well as sensors and motion detectors, air quality control and fire detectors, all have had a major role in providing a safer environment for residents. These technological processes help in monitoring crimes or incidents before

they happen and alarming the needed parties to handle the situation in time if a crime has occurred. Another aspect of security that has been covered involves providing facial detection process to recognize criminals and allow law enforcement to take the necessary action when needed. Sensors and weather detectors provide information of any natural disaster, or fires taking place that will alert the needed parties such as firefighters of the incident-taking place.

Many cities have adopted such security measures using advanced methods that have shown major change in crime such as Nairobi Kenya and Shanghai China where surveillance systems have been implemented and connected to law enforcement and police bureaus that will alert them of any incident that takes place. (Low 2018)

Many cities worked on providing public safety initiatives for their residents. One phenomenon that is emerging is creating Robots that are used as security to fend crime, in Dubai the Robocop robot was introduced in 2017, that aims to provide assistance to Police headquarters after roaming the street in the event of an unfamiliar incident. In China the Police Robot also emerged as a new idea being tested, aiding passersby in inquiries they might have and build with sensors and cameras that also in the event of an emergency informs the related authorities (Initiative 2017) .

II. Water/Waste Efficiency

Another concern of cities that have been a main issue to tackle has been water and waste control. In regards to how water is used, transported, lost and used creating a form of water management controlling system is necessary as a result having smart water grids have been created to handle such factors. Water grids allow the right people to control and monitor the type as well as the amount of water being transported, and if there are any leakages, it alerts the right people where the leakage is.

Another area where technology has been employed to handle water issues and helps control the amount of water wasted or control the increase in water from floods, include,

controlling the water flow and using smart water meters to detect water flow in pipes, while smart valves control the flow of water in the pipes as required. In addition, there are smart pumps that control the speed of water that is alerted by sensors to adapt according to whether the water should be reduced or speeded up.

For example, smart water meters that can automatically detect the level of water flow can connect with each other to adjust the water level when necessary were installed in Castellon Spain, reducing the amount of time normal water meter need to adjust and reducing the amount of energy needed to complete the task. (Low 2018)

III. Traffic Congestion

One of the most common focuses of smart initiatives found in most cities that have adopted smart technologies is in relation to traffic congestion and traffic control. Initiatives adopted have helped cities control and monitor their traffic, with the help of technological advances such as sensors installed around the cities, in traffic lights and in some situations even in cars. Smart systems has provided cities with ways of reducing traffic congestion, traffic patterns have been able to be collected in regards to areas of extreme congestion, locations where drivers require to quickly brake while driving have been identified, dangerous intersections that have major accidents continuously have been monitored, allowing for the necessary solutions to be implemented where needed.

Another way that smart traffic monitoring has been created includes controlling pollution and exhaust control caused from traffic, using sensors that can detect the amount of toxins and carbon dioxide in the air to reduce the amount of traffic in certain areas such as the smart application implemented in Las Vegas (Low 2018).

IV. Transportation

Transportation and the use of advanced mobile channels has been a major issue for cities. With increase in urbanization more people drive vehicles while in turn result in

more accidents and more traffic congestion and more pollution therefore governments have been working hard on creating alternatives for such factors, such as, encouraging the use of other transport systems.

One way is encouraging resident to use of public transport by providing transport of all kinds such as trains, metros, buses with mobile applications informing citizens of the arrival and departure times and the routes they take, providing small rates and better alternate routes throughout the city to reduce traffic congestion.

Other areas in which governments encourage people to use emission-generating vehicles less is by encouraging the use of electronic vehicles. To work on health population reducing air pollution and encouraging a more healthy lifestyle governments also encourage rentals of bicycles, creating areas that rent bicycles, and providing bicycle lanes throughout the city and even creating areas for pedestrians to reduce the use of vehicles (Low 2018).

V. Healthcare

Healthcare is another area that needed to be improved, providing online access, smart services and smart applications have been a major advancement for both physicians and patients.

Most hospitals now use what is known as the *Electronic Health Record*, which can be accessed by authorized personnel from the hospital's system showing a patient's entire history and all required information in just a few clicks on one platform. This record can be accessed by the assistant or receptionist to create an appointment for the patient and by the cashier after consultation to access what the patient's consultation bill is, and by physicians to check a patient's records (Beckers 2014) .

Another innovative idea is the *mHealth*, this is an online system that only required wireless connection and can be read from any smart device or tablet to access

information and related data of patients allowing doctors to easily view a patient's records health and monitor areas such as heart disease, diabetes, asthma. This process helps them control the patient's medication and follow-up on their health and even reduce actual appointments to necessary ones when needed (Moyle 2015). Another health-related advancement is ***Patient Portal technology*** is a secure online platform that can be accessed by both doctors and patients to access medical records and interact online, allowing patients to become more closely involved and better educated about their own health making them more responsible. These portals can also be used to make appointments, pay bills online, get prescription refills and easy process access for patients (Heath n.d.).

VI. Public Services

One type of Public Service initiative provided in Smart Cities is Open Data, provided by the government, with the aim to encourage citizen involvement and participation. The idea behind open data is providing transparency and allowing citizens to know what is happening, some governments even listen to citizen's suggestions and complaint and work on finding some common grounds (Näslund E, Strömberg F 2017)

Public services provided by the government aims in general to improve the city's quality of living in different areas, in making living easier, to simplify access to public domains as many such goals. For example, in Singapore garbage collectors are informed when garbage bins are full with the use of sensors installed on them, allowing for time management to be controlled. In order to control traffic congestion, sensors are used in other areas such as traffic lights, with the help of camera, governments can collect traffic data as well as air control calculations to analyze congestion and air quality, as well as reduce crowded areas and monitor the weather (10 smart public-sector ideas 2012)

7. Smart Governance initiatives

While smart initiatives are diverse, focusing on energy, mobility, the environment, the economy, policies, administration and quality of life, are the main governance areas of focus chosen to achieve the ideal model for sustainability. Smart Governance is required in all sectors of a community and providing the best type of governance is very important for a city to become a smart city. Different areas of a city need to be managed properly and in many areas applying the right kind of management and technological tool depends on the requirement of that city. Various smart governance concepts and initiatives were adopted by cities in different sectors.

- The 2011 White Paper on Transport - Urban Mobility Plans, aimed at improving the EU transport system to achieve the Common Transport Policy goal. The White Paper initiative also focused on road safety technologies, door to door mobility innovative transport and strategies for zero-emission urban logistics. The Action III digital agenda of the European Commission worked on several issues focusing on Active and Healthy Ageing, Green cars, energy efficient building, and public private partnerships, adopting the European Innovation Partnership and the Partnership Strategic Implementation Plan and the Operational Implementation Plan (OIP). The 2011 White Paper on Transport - "Urban Mobility Plans" aimed at improving the EU transport system to achieve the Common Transport Policy goal (Arnd 2016).

- One of the main mechanisms in Europe that has provided research funding to promote smart innovation has been the Framework Programme for Research and Technological Development and in order to promote research it funded the Strategic Energy Technology Plan (SET plan), which allows for smart initiatives to be funded under the development of smart cities and communities, in what is called Energy policy, focusing on the reduction of energy use in homes, buildings, transport systems and many other areas across Europe, to achieve a reduction of gas emissions of over 30% by 2020 in an effort to promote change, better quality of life and sustainability. (Vanolo 2014)

- Another Energy initiative introduced by the European Commission was the **Energy Union Package** aimed at controlled the climate and energy emissions through research and competitiveness, energy reduction measures and energy efficiency, to enforce the climate change policy strategy in order to decarbonize the economy, create equal access to energy to energy providers and improve energy market and guarantee the security of energy throughout Europe. (European Commission n.d.)

- Another European approach is the **EU 2020 Strategy** of 2010 which aimed at creating a 10 year margin to improve the European impact on the global arena that focused on creating better job opportunities and reducing poverty, improving climate change and energy use, promoting sustainability and the preserving natural resources. This approach promotes climate and energy initiative and aimed at boosting the Economy European situation and businesses to adopt digital technologies and infrastructure (Arnd 2016).

- The **Pressure-State-Response (PSR) approach** is another approach proposed by the OECD in the 1990s and adapted many years later, as it was clear that human actions put pressures on the environment affecting its state and how in turn society responds to that. The approach suggested here, works on trying to provide a solution or prioritization approach to create a linkage between action, reaction and solution. The suggested pressure include transport, buildings, the use of natural resources, the effect of waste and use of energy, and how they all affect the environments, the land, climate change, the air and water. This framework works on the way we respond to these actions and the actors involved such as people starting from their homes, organizations, international involvement and such members. (OECD-Sustainability 2010)

8. Smart City initiatives around the world

The world as a whole has come to the realization that major efforts should be applied in order to be able to handle the global or natural challenges those countries as facing.

Whether the challenges are related to urbanization, climate changes, global competition and many other factors, it has come to the attention of many countries that finding and adopting solutions or way to handle the global and natural changes occurring is necessary.

There have been a great number of approaches and initiatives that have shown success and have created their marks in cities. Some of these initiatives are found in different cities all around the world with different focuses, depending on what each city needs and what each city's goals and visions are.

As cities work on improving themselves, we find many innovations and projects being applied that have shown great success. Some of these innovations are funded by international organizations and with the help of major companies, they have been implemented in different cities across the world.

- Europe

France, Grenoble

In France, the city of Grenoble focused on improving its environmental status by working with Gaz Électricité de Grenoble (GEG) and Atos Worldgrid for the development of an energy management project, allowing a collaborative management of energy production, distribution and consumption. This project involves creating an interface that is used by the city, the stakeholders involved, the decision-makers and the citizens (Dupuis n.d.)

It includes installing smart meters in resident's homes and working areas. The information collected can then be used to allow decision-makers to provide the right decisions needed and view the progress of the goals they have achieved in their energy and climate plans for the city (Fresier D, Morel B n.d.).

France, Paris, Issy-les- Moulineaux

In the area of Issy Les Moulineaux in Paris an energy grid was created. This grid is also aimed at energy management, designed to measure consumption of all types of energy from residential and commercial infrastructures, from homes to businesses and manage their levels of consumption according to the results outcome. This project included the public private partnership of several companies including Bouygyes Energies & services, Total, Boygues Telecom, Schneider electric, Microsoft and a few others. (Dupuis n.d.)

Vienna, Wein City

Some of the approaches are widely centered in European cities such as Vienna. Vienna took a more social focus in regards to smart approaches. "Our vision of the Smart City is based on social inclusion, maintaining a heterogeneous society and narrowing the socio-economic divide," as explained by the surveyor and urban planner Pia Hlava, who is project manager for tasks relating to the Smart City Initiative Vienna at City Hall, told the audience in Amsterdam. "In addition, Smart City Vienna aims to achieve greater social cohesion and quality of life (…) In Vienna, we will achieve this goal through social participation and by the provision of services which meet human needs" (Canteneur 2015).

Considering "Wien" is the German word for "Vienna", the city's innovation plan is named the City Wien Initiative, it was launched in 2011, and by 2013 had created a framework to follow and complete by 2025 directed at three sectors, resources, quality of life and innovation. There is the Urban Development Plan for Vienna Step 2025, focusing on public participation by providing administrations and businesses with guidelines to involve other stakeholders. Then there is the BMVIT, which adopted its 2013 city of the future initiative and technology programme to adopt projects such as energy-oriented urban planning, design and technology used for modernizing buildings. The Vienna Business Agency established the Aspen IQ technology center that created the first energy office buildings in Austria for forward – thinking research for start-up businesses with laboratories and production areas. Aspen smart city research (ASCR GmbH) also created three buildings

focusing on smart building technologies, citizen participation and management grids that aim to achieve energy efficiency, reduction in CO2 and providing user friendly solutions. Other city initiatives include, Wien City, introduced in 2011, to be achieved by 2050 focusing on innovation, quality of life and resources. Austria has also adopted the Climate and Energy Fund KLIEN-FIT FOR SET in 2010 aiming on emission-free urban areas, as well as the structural fund budget for European for the period of 2014-2020, launching the "STRAT AT 2020" project with BMVIT and the Association of Austrian Cities and Towns, focusing on the utilization of the funds in the application of Smart initiatives and projects (Wien 2015).

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Finland, Helsinki

In 2006, an innovative unit named the Forum Virium Helsinki (FVH) was created in Helsinki, Finland. This innovative unit's aim is to develop the foundations of the city's future innovative smart city strategy. The smart initiatives introduced included, allowing open data and increased transparency known as Helsinki Region Infoshare (HRI) and Open

Ahjo and Smart Kalasatama, which is a model district of smart urban development. There is also providing empowering innovation created through Helsinki Loves Developers and Apps4Finland, as well as boosting and scaling up city innovations by using harmonization and collaboration through CitySDK and managing technological change by Code for Europe. "For Helsinki, Smart City means more than advanced infrastructure and state-of-the art technological solutions. For Helsinki, Smart City signifies also advancing open engagement of the citizens and the rest of the city community, pioneering in open data and transparency of city governance, as well as promoting agile service development." Jarmo Eskelinen, CEO of Forum Virium Helsinki (LivingLabs n.d.).

By applying all these initiatives, this unit was able to accomplish over 20 projects relating to several areas of interest that have greatly improved the city in areas such as transport, health, education and community and public services (Casbarra C, Amitrano CC, Alfano A, Bifulco F n.d.).

Spain, Barcelona

Another city that has worked on successful smart initiatives is Barcelona, since 1990 it has been one of the well-known smart cities benchmarked at international levels. One approach, which helped identify the need to integrate the steps of a Smart City Framework is the City Protocol program, established by Barcelona city with the support of Cisco. This program used a governance based approach using the collaboration between the city and other stakeholders such as businesses, companies, educational institutions, and several key parties with the aim of creating a science of cities achieving smart services and businesses through encouraging the introduction of new ICTs applications, new leadership models and citizen communication (Falconer G, Mitchell S 2012). Furthermore, the 22@District Barcelona, introduced in 2000 as an urban transformation plan to redesign the previous area of Poblenou into an innovative area providing modern spaces for knowledge based activities that has now become a model of innovative urban design for cities across the world (Casbarra C, Amitrano CC, Alfano A, Bifulco F n.d.).

Netherlands, Amsterdam Smart City (ASC)

The Netherlands created the **Amsterdam Smart City initiative** in 2009 for the Amsterdam Metropolitan Area encouraging companies, citizens and other institutions to suggest innovative ideas and sustainable solutions for the city in order to improve economic growth, quality of living and use of natural resources and become one of the top smart cities by 2025. (Casbarra C, Amitrano CC, Alfano A, Bifulco F n.d.). Throughout the years, ASC started collaborating with top players such as ABB, Accenture, Cisco, IBM, Philips and Siemens and many others followed, and as a result had involved more than 100 partners collaborating over 50 smart projects, working on various innovative approaches such as Data sharing, recycling, communication and encouraging citizens to join (Harmsen 2016).

Denmark, Copenhagen Smart City

For years Denmark has been known for its citizen involvement in urban development and the government collecting and storing information from citizens and businesses to improve services in its administration and other sectors. With the already existing setting of smart city methods, and the plan of becoming fully independent of fossil fuels by 2050, Denmark is considered one of the world's early adopters of new technologies (Hall n.d.).

Copenhagen's aim of achieving the world's first carbon-neutral capital by 2025, has made it focus on may smart strategies and innovative solutions on transport, waste and water, heating, and alternative energy sources, by applying a governance decision of collaboration between public authorities and private companies that together can make of Copenhagen a sustainability benchmark and a preferable living lab testing ground for smart city technologies (Casbarra C, Amitrano CC, Alfano A, Bifulco F n.d.)

England, Manchester Digital City

Manchester city had been working on becoming the world's top digital cities by 2020. The approach used is connecting businesses and citizens and allowing data to be easily

accessible online and creating partnership between the public and private sector. This process is achieved through providing 100% fast broadband coverage throughout the city's public spaces, which also involves educating the community and encouraging digital use and therefore requires promoting investments to help increase economic growth (Confidentials 2012).

Other initiatives the city is focused on involve introducing new technology products and application markets, increasing access to health services at home, allowing citizens to be involved in the city, working on reducing living standard costs such as heating homes and reducing carbon emissions (Casbarra C, Amitrano CC, Alfano A, Bifulco F n.d.).

- The United States of America

New York

Smart city initiatives have also had an impact in other continents. With the help of Cisco IBSG and other players, New York city introduced the *City 24/7,* introducing an interactive platform to deliver information from government programs, citizens and businesses, to people at any time and on any device, and distributed them all over the city in public areas such as pay phones, train stations, shopping malls and on smart screens to be accessible to everyone (Frazier J, Touchet T 2012).

Chicago

Chicago also took action towards smart initiatives through the Department of Innovation and Technology (Do-IT) and with the help of Cisco Smart & Connected technologies. In 2013, one of their approaches was towards using technology to enhancement of citizen health and wellbeing by dividing it into twenty eight sections broken down into five strategies, focused on people and businesses connectivity; and services, economic growth and opportunity. The city's *SmartData Platform* was an award winner, providing predictive analytics to more than 7 million rows of data per day, which also included the *Windy's Grid tool*, allowing city officials to have important information available,

accessible to emergency responders and city officials in order to visually see what is happening throughout the city to speed up any necessary emergency responses (CISCO n.d.).

Kansas City

Another American city that applied smart approaches, is Kansas City, its innovative plans involved several areas such as Water and General Services, IT, Public Works departments and many others; focusing on creating communication and improving connectivity throughout the city, increasing revenue and enhancing the city's infrastructure and working on encouraging technology start-ups from around the world. This idea involved applying a public Wi-Fi network throughout the 2.2 miles downtown areas, providing community kiosks for the people, to take part in city services and conduct digital transactions, the city also applied video sensor and smart lighting in existing street lighting to capture information for future purposes (CISCO n.d.)

- ## Russia

Moscow

Russia has also worked on the concept of Smart cities, since 2011, the country has launched its Smart City program. Starting in Moscow the program was created by the city's Department of IT (DIT), this initiative resulted in major innovative projects in different areas of the city that involved everything from Healthcare projects up to traffic control. Creating a wide broadband network and Wi-Fi access and over 1,000 Wi-Fi hotspots distributed all over the city, this initiative allows citizens to access the web whenever they want. As a governance initiative the government improved its internal systems and applied e-government services to increase efficiency and transparency of its operations through providing services online, unifying their accounting and procurement online processes (Sutton 2018).

To get the people involved the city created several projects, one of which is the Active Citizen project, a platform where people can share their opinions on development policies such as parks, green initiatives and provide their insight on them. Another idea is Our City, which is a complaint platform that people can access to complain or provide insight on any irregularities they face or see. There is also Crowd, where people can input their ideas or suggestions that can be used to improve the city.

Another area of interest involved Education, where a program, the Moscow Online School project which is a cloud-based platform where more than 700 schools including students, teachers and even parents become connected. These schools where provided with interactive screens instead of white boards, Wi-Fi, tablets and laptops instead of textbooks and many other technologically advanced measures making it the largest e-learning project in the World. This process allows teacher to monitor and evaluate a student's grades, progress and needs (Tkatchuk 2017) (Tuzmukhametov 2017).

- Asia

Singapore

In an effort to become "Singapore Smart Nation", Singapore has fast tracked on the Internet of Things concept, and has worked on adopting the concept in every area possible. its aim is to turn the city into the Digital world of technology that encourages innovation and development, and provides its people with transparent and efficient services in a safe environment for every individual.

In order to achieve the Smart Nation it wants, the city put up sensors all over the city, in every bus and every taxi, in parks, on building. Using these data, they have reduced from 92% the number of bus services with crowding issues, despite a year on year increase in ridership. Another sector disrupted by the Smart Nation initiative is waste management. Sensors have been installed in bins in order to know when the level is full and empty them in time.

By 2020, people who need a car in Singapore will be able to use any one of 1,000 electric vehicles parked across the country for public use. One of healthcare's fastest growing sectors is tele-health, which is the use of telecommunications technology to improve healthcare. For example, doctors could use mobile devices to monitor patients' health remotely. (Souppouris 2016)

Seoul South Korea

Songdo, a city east of Seoul, is the one example of smart projects that has been built from scratch. This project started from 2002 and should be complete by 2020. The city is filled with sensors all over its streets and buildings (Wenger 2018). The International Business District in the city is being adapted as an area that will not require driving but instead public transport is available almost all around the city accessible to everyone in short distance from homes and offices reducing the need for cars and encouraging the use of bicycles.

The progress of the city will include a smartcard that can access several locations as well as a person's home, from parking to movie cinemas. In regards to health a mobile service is being created that will monitor health conditions of citizens, mainly senior citizens who live alone. (Kshetri N, Alcantara L, Park Y 2014).

- India

Cities from all over India

With one of the biggest populations in the world, India had worked on trying to adopt to the changing world and find ways of improving the standard of living of its citizens and cities. As urbanization is taking over many areas in India, finding solutions to welcome this amount of move is very important. In doing so, the *Smart City Mission* was created in 2015 to improve urban life by adopting smart solutions in 100 cities from all over the country. The mission involves improving the quality of life and making the city

environmentally friendly and utilizing smart solutions to make the are more sustainable and improve the people's quality of life (Ismail, Smart cities in India: Embracing the opportunity of urbanisation 2018).

The idea of this project is to encourage cities in India to adopt smart initiatives. A city is selected from each are or state and then all the selected cities are to compete on providing the best smart solutions they locally need to make their city environmentally friendly and sustainable and according to that their city is funded by the government. The city has to create its own governing body who will oversee the implementation of the projects considered, this body is called the Special Purpose Vehicle (SPV), with a person or Officer heading it. This vehicle will plan, manage, operate, monitor and follow-up on the implemented solutions.

This project encouraged citizens to participate and become involved. In two years, many of the cities involved were competing as the best ranked city for cleanliness and waste management. The Mission has encouraged these small cities to put additional effort and work harder on reaching their goals of becoming smart and this involved taking part in many projects and innovative idea Awards.

The project is still in progress and will need more time to be complete, so far it has allowed many cities in India to achieve better standing that what they were a few years ago. By the end of this project Indian cities will become some of the smartest cities in the world, if the Mission continues and the solutions suggested are implemented as they are now (Sharma 2018).

- China

Hangzhou

With a city that holds up to 9 million individuals, Hangzhou in China worked on trying to find a solution to control the city sections and reduce the problems it is facing. Officials

collaborated with Alibaba and Foxconn, two of the best tech companies in the world, to try to find a way to make the city responsible for itself, by monitoring and solving its problems.

This *City Brain Project* involves collecting data and analyzing the best solutions required and is applied on all areas of the city, from healthcare emergency calls to traffic congestion, with quick responses created and applied when an issue arises (Wenger 2018).

With the creation of an Artificial Intelligence (AI) platform, this project tracked every individual living in the city and collected data that it later applied into its system. It then followed patterns analyzed from the information available, which helped solve many issue and control many areas of the city, from traffic control, traffic accidents to crime decline, as well as provide individuals with information through their smart devices and smart phones on city traffic, weather and any related conditions that arose (Andrews 2017).

- Middle East

Abu Dhabi

The Emirates city of Abu Dhabi is another city that has joined in on the application of technology to turn itself into a smart city. The united Arab Emirate government planned to create over 100 smart projects and provide over 1,000 smart services through the region, mainly focused in Abu Dhabi. One area of focus building Abu Dhabi into an international business hub which required increasing productivity and improving the quality of life for its citizens, this was done by creating the Abu Dhabi Smart Government Programme and the Abu Dhabi Data Exchange programme (MiddleEastBusiness 2017).

The city worked on its image from a touristic point of view, aiming to increase its presence in the world and make itself the first destination where people want to visit, do business and even encourage them to live in. The Department of Culture and Tourism

worked on creating a digital online application platform ***Abu Dhabi Culture online*** providing access to many services and reference information on the Emirati culture and information of touristic destinations and heritage of the Emirates.

Another service provided included the ***Event Ticketing System*** to ease the process of Events licensing and ease the process of buying tickets for Events (Geronimo 2018). Another App that has been developed is ***CityGuard*** provided by the government that allows citizens to post their complaints or concern in relation to the government has provided services. The government also provided free WiFi for residents in all Taxi's to keep up with technology (Masdar 2018).

Dubai

Dubai has been working on evolving with the trend of smart cities for years now, trying to improve its sustainability, security and working on it's technological advances. One of the areas of focus is it's security. Dubai introduced it's man less taxi service, a vehicle that roams the streets equipped with sensors and camera to try an detect irregular and curious incident that would then be sent to authorities in the event of an accident or emergency occurring (ExpoTrade 2018).

The different cities that have implemented or worked on improving themselves with smart initiatives are appropriate examples of how technology has helped improve urban living.

Governments have gone to great lengths to try and advance their cities and improve them, with different smart initiatives, strategies and projects. With the help of technology and technological advances, the internet and digital technology, cities have adopted various ways that have allowed them to grow and improve and become smarter as shown in this Chapter. To be able to apply smart policies and technologically advanced initiatives in cities, and coordinate across governmental departments, as well as be able to communicate with citizens and other stakeholders and agencies and manage these

sectors, a smart form of management and administrative body should exist, a form of smart governance.

Chapter summary

The chapter starts with introducing the beginning of smart cities, as a result of cities needing to improve, adapt and move forward. It then explains the different types of cities that have been discussed by scholars and practitioners for many years as a result of smart initiatives and smart communities arising. These include intelligent cities that offer technology-based services and apply e-governance programs and have digitalized systems applied in almost all a city's governmental administrations. There are sustainable cities that are defined by the ability to sustain anything, and last longer under any situation. And there are liveable cities defined by maintaining the individual, social and environmental presence and wellbeing of the city and preserving it for future generations and finally we discuss a utopian city creates a world of systematic and organized life styles can solve and fix any problem that might arise. It is what most cities aim for and it is where most people want to live in, with an organized and coordinated system of living.

The chapter then moves on to discuss Rudolf Giffinger's characteristics of a smart city as the balance of these characteristics is vital in understanding how a city functions, and they include, Smart Environment, related to the environment and resource used, it focuses on using advanced solutions and technology to solve issues to protect the environment, then there is Smart Governance, which is vital because to implement and maintain the proper form of initiatives and make sure that they are followed in an appropriate path towards achieving their goals we have to have managing body that can provide the framework to be followed. There is also Smart Living which includes using smart technologies and intelligent network to control the daily life of an individual and allow them to control their personal environment to make living comfortable and convenient in all its areas of life, and then we explain about Smart Mobility which involves providing easy mobility services through accessible means and methods, and using Information Communication Technologies and other technological advances. There are also other characteristics mentioned that include, Smart People which means individuals who are responsible, educated and qualified, who have a drive for continuous advancement and learning, open to different cultural differences,

which are flexible and creative and open to new ideas and improvement. And that last characteristic is Smart Economy which involves the application of people's knowledge and skills in creating products and ideas and implementing them in the right places using the existing resources to develop innovative programs and solutions, integrating international markets and providing creative and innovative services.

The chapter then provides an explanation of the different elements involved that have a great effect of smart cities, such as technology which include many technological system, technological advances and sensors that are used in connecting to people, gathering data, and applying control on many factors in the city. There are other elements mentioned that affect smart cities such as the infrastructures build and the sensors or system applied to them, and then there are the natural resources and the way they are used, such as greenhouses, misuse of land and such. Other elements mentioned include the economy and how smart cities can boost their economies, also how policy is developed and implemented and maintained by cities. There are also management and governance elements and how much they affect a city's administration, governing body and decision making and the effect on the community as a whole.

The chapter then provides a review of the different areas of focus where smart initiatives are applied such as for security, traffic congestion, water and waste management, transportation, healthcare and public services. Finalizing the chapter with the different initiative created and applied around the world from different countries in different cities.

As it will be explained in the next chapter, with the introduction of Information Communication Technologies (ICTs), the Internet of Things (IoT), sensors and networks, many of these solutions have been adopted and allowed governments to become more transparent, responsive, and accountable and provide efficient and effective services to their citizens will be explained in more detail.

Chapter 4: Smart Governance

Smart governance is the main form of management process that can aid cities in applying smart initiatives and adopting smart projects. The concept of Smart Governance is linked to all aspects of a city, it is the idea of applying a framework or structure into a city that can support, develop and upgrade itself through the incorporation of technological advancements, Information Technology and Communication systems, financial boost, new and equitable policies and laws and improved and direct services that are sustainable and that can enrich a city and allow it to automatically handle risks and challenges it might face in the future. With smart governance we can apply smart concept and systems in a clear, calculated, organized and proper way depending on what the city needs, and what its environment is able to support.

Cities should be able to adopt a form of governance that can aid them in achieving their vision or goals and as we move into the new era of technology, we find that cities have moved on to using smart solutions and initiatives in the path towards improving themselves. With the help of smart solutions many cities have successfully improved their services, their mark in the global market, their waste problems, and many other factors that define them as cities.

1. Overview of Smart Governance

Governance is a framework developed to aid governments in encouraging transparency, communication and efficiency of processes in their administrations when it comes to allowing citizens to take part in decision-making and collaborate with businesses and other stakeholders to achieve the most effective policies to be used and adopted by the community. To achieve sustainability it is important to create efficient policies to identify and correct any issues resulted from the adopted initiatives to achieve efficient smart services that can last, as this will have a great effect on citizen participation, government

activities and management of other stakeholders (Casbarra C, Amitrano CC, Alfano A, Bifulco F n.d.).

Having good governance to achieve sustainability is vital in Smart Cities, many organizations and tools have been developed to apply a governance structure that suits each urban environment according to what it needs. Each aspect of governance has a specific aim but they all follow one pattern, achieving a smart city. Good governance is composed of several elements as discussed in the previous chapter and when applied properly these elements would make any city succeed in providing the best quality of life for its people.

The Internet and digital technology have become a vital part of modern life integrated in several areas such as transport, healthcare, education and many other sectors of a city. To be able to apply smart policies and technologically advanced initiatives in cities, and coordinate across governmental departments, as well as be able to communicate with citizens and other stakeholders and agencies and manage these sectors, a smart form of management and administrative body should exist, a form of smart governance. Smart governance is needed in order to manage a smart city. There are several ways to communicate with stakeholders to encourage collaboration and cooperation between the government and citizens. One type of smart governance is the use of Information and Communication Technology (ICTS); this involves using the Internet and all technological tools to connect with the community. Then there is e-consultation, allowing citizens to voice their ideas and providing government programs and projects to allow citizens to be involved and heard, and then there is e-data, which includes government transparency and allowing citizens easy access to needed information (Smartcity 2017) .

Smart governance is an important factor when considering Smart Cities since the information of a public policy can have a great effect on how certain issues are undertaken and can affect all the other elements. Smart Governance can affect many areas in a city, such as public participation, services, transparency, access to information, stakeholders, technology use, and therefore requires effective leadership, but for it to be successful it needs to work in a

way that encourages efficient planning and application, as any issue or project that may arise will need to be addressed from many aspects and will involve many stakeholders, departments and organizations which will require the right policies and provide the correct communication and coordination principles needed.

Encouraging road side air quality and reducing traffic congestion, for example, requires a shift away from carbon-emitting vehicles and therefore requires easy facilities and encouragement which can only be done through good Governance. Such a sustainable transport system requires smart governance to help encourage this kind of transition. It can be by the introduction of hybrid and electric vehicles, providing tax breaks to companies that use zero-emission vehicles even by encouraging cycling, creating cycling lanes and bicycles rental systems, and using mobile applications to provide more information, better access to cyclists, biking rentals, hybrid and electric vehicles, and many more suggestions. Such factors could have an effect on achieving a zero-emission environment, encouraging public participation, providing transparency, encouraging the use of advanced technology, and trying to make use of existing resources (Kumar V, Dahiya B 2017).

Smart governance can be found in many areas of community life, with the right policy and project applied it can be used to provide solutions and improve the quality of life. When it comes to citizens, smart initiatives should concentrate on available healthcare, safety, efficient and effective public services, better and easy access to education, social cohesion, better housing and residential availability as well as better quality of life. If we want to refer to the environment, smart governance can have a huge effect on energy control, air quality control, water and waste water management and sanitation, land and natural resources sustainability, pollution and traffic congestion control as well as climate control, meaning that with the right structures applied and followed, these areas of importance could provide solutions that can have a positive effect on the community.

Other areas of interest that can be affected by smart governance include the community's residences, this involves job opportunities, employment availability, equity and inclusiveness

of citizens, green and hybrid solutions, economic boost and market reshaping as well as investment funding. Economic factors can be affected by a city's existing opportunities and improvements could be applied on them, with the right governance scheme applied, such as focusing on tourism and cultural awareness and competitiveness. Governance projects when developed, can be designed for specific needs and requirements, they can be re-shaped into the risk at hand and can be applied anywhere for example in government departments, and government processes as well as decision-making and institutions (Airaksinen 2016).

2. Applications of Smart governance

Smart Governance is a very important factor when it comes to creating Smart Cities and Smart innovations. In order for smart initiatives to be applied and managed properly, a suitable and proper administrative structure, with the right applications and innovative policies adopted should be created and followed, and for this reason, considering the smart governance approaches is vital.

There are many Smart governance approaches that aid in the implementation of Smart initiatives, and have been adopted by many cities, successfully allowing them to become smarter, improving their policy implementation, coordination among their bureaucratic departments and agencies, reducing the challenges of over-population, congestion, air pollutions, education, healthcare and many related factors. Creating the best suited approach involves understanding what a city needs and what it requires to improve it and to allow it to grow and progress. There are several tools and techniques that governments can use to apply smart governance, whether it involves using technology, or advanced business models, or redefining their policies to suit global changes and markets, or all of the mentioned, investing in these techniques will allow governments to reach a better, improved and advanced level of performance in services, businesses, markets, security, quality of life and many more areas. (Maya 2017)

In order to understand the tools and applications involved in Smart Governance we have to focus on several factors; a) the technology involved, b) the stakeholders involved and c) the collaborations involved. These three aspects are what will allow smart governance to succeed and what connects everything else together. Some of the tools applied by cities that are considered Smart applications are mentioned in the following paragraphs.

I. Information Communication Technology ICTs

As cities are becoming smarter, the need for citizens to be more in tuned with technology and better-informed means the need for governments to be the same. Having the capability to give citizens better and more efficient services in a transparent and responsive way means that governments have to adopt technology in their governance and management structures as well, and in order to do so, having a system that allows this interaction to be swift and feasible is essential. *Information Communication Technology,* also known as ICTS makes up the structure or process of using technology and communication to interact in what we now consider the digital world. ICTs include all technological components such as network systems, computers, smart phones, and other electronic devices, in addition to other applications and systems. Almost everyone uses these components, in this modern day and age for communication, for businesses, for personal use; by governments, by organizations and many other entities, making ICTs a vital part of our daily life.

As popular as smart technology has become in recent years, there are still some countries that do not have ICT access and have not joined the digital world yet, therefore various organizations, governments and the World Bank have all promoted and created strategies and programs to help these areas join the modern age. Even the United Nations set a goal under its Sustainable Development Goals, to bridge this gap of lack of digital access in these countries and provide them with internet access to be achieved by 2020. (Rouse 2017).

This need to have internet access and be connected online has become necessary in our daily life and as cities try to transfer themselves into smart cities, using technological advancements seems to be a requirement. A city is not smart unless it improves and upgrades its services and utilizes its resources and infrastructure in the best way possible. ICTs have been engrossed in every aspect of our daily life and cities and the smarter a city is considered the more ICTs and systems it adopts, whether it is for traffic light, healthcare applications or smart phones messaging.

ICTs are vital for smart cities as they can be applied in various ways and areas that would allow government to improve their services, resource management processes, operations, economic competitiveness, employment opportunities and educational services, environmental sustainability and the quality of life of their citizens (AlliedTelesis n.d.). ICTs can even help in areas such as transportation, climate control and other infrastructures. And with their applications and use, they reduce costs, enhance quality of services and communication interactivity between entities, agencies and citizen involvement, as well as allow governments to gather data, interact with people and their needs. Different ways to apply ICTs include e-services, smart devices and tools, web-based applications and systems, broadband networks, sensors and e-governance (Bhatnagar S,Garg D, Bhatnagar M 2014). ICTs are a vital part of a Smart City, that allow for smart networks to exist and smart accessibility that provides the connection between the city officials and the citizens.

ICTs are found in almost every aspect of city life, in governments buildings, all the way to citizens' mobile tracking systems.

- Government Management and Facilities: With the use of ICTs and applications, governments can monitor and manage the large number of infrastructures, buildings, and other government structures through ICT communication of their facilities and operations, allowing for better communication, easy access and responsive action when required, reducing the paper route and bureaucratic phases previously

conducted by governmental departments and offices. (Kreyon 2017) With the use of ICTs, governments can provide better services in regards to departmental and administrative operations, enforcement of the law and urban planning measures, with the use of the related systems and networks, being able to access such areas allows for faster responses reducing service delivery time for citizens and other stakeholders. (Mishra 2013)

- Nonprofit Organizations: governments can encourage non-governmental organizations (NGOs) and provide them with online access in order to communicate with them, monitor them and provide a way to aid them when they need assistance, plus provide them with access to many factors they might require. This portal can provide the NGOs with access to government departments ease their work, attract volunteers and encourage funding. (Kreyon 2017)

- Shared taxis and Transportation: With congestion and traffic causing huge air quality and transportation problems, the introduction of online ordered taxis have become popular in the past few years. Encouraged by governments and introduced in many cities, this concept has become a common way of transport for many locals and even tourists in many countries. It involves ordering a taxi online and paying online at the cost of the distance taken, which reduces the amount of cars on the roads. (Kreyon 2017)

- Smarter buildings and urban planning: with the use of ICTs , governments can distribute sensors and control systems through all the areas that require observation and monitoring, whether it is for climate control, energy control, sustainability measures and many other areas for infrastructure monitoring. In such cases using the right sensors will provide data that can allow cities to control many aspects. (Mishra 2013)

- City Ecommerce Portal: governments can aid their businesses in the international scene with the use of e-commerce portals by using ICTs in providing a platform for city vendors to sell their products both internally and globally. (Kreyon 2017)

- Tourism, social and cultural events: another way ICTs can assist cities is through the introduction of tourism applications allowing tourists to access touristic locations, book online and help them in any way they can to provide them with great experiences on their visits, thus encouraging the city's global vision. Cultural activities are also in need of ICTs and applications that can allow for the "word to be spread", encouraging activities and events that can enrich a city and also attract more tourism and help develop the cultural scene of a city. (Kreyon 2017) as well as social programs, promoting collaborations, partnerships and community communication and following up on funded activities and efficiency of service delivery. (Mishra 2013)

- Health and Education: as Healthcare is an importance part of citizens' lives, the ability to provide easy access to data, inform citizens and provide modifications and statistical analysis when required, having smart systems and networks linked to these services is a smart measure that can be applied by governments. In addition looking at the Educational system would show that the need for improved services and initiatives are also required thus the need for advanced systems being applied there too. (Mishra 2013)

II. E-governance

To achieve smartness, governments should have smart management and governance structures to communicate with stakeholders through flexible modules and applications. Therefore, in order to become more transparent and improve service delivery, smart governments work on providing digital information across all their segments providing citizens and businesses with the data they need and applying what is known as e-governance practices to ease this process.

As governments try to improve their services in various segments of their cities, they need to upgrade their services in all areas, and providing e-governance applications is necessary in areas such as healthcare, education, transportation, and many more. This process is a form on two-way communication process between the government and remaining stakeholders and can be divide into three interactions, the Government to Citizen (G2C) interaction where governments provide citizens with access into their databases and government information. This also includes allowing them to pay their governmental fees, apply for benefits, and provide their feedback, suggestions or complaints in certain available online webpage Then there is the Government to Business interaction (G2B), where governments allow businesses and other organizations in the public sector to conduct online transactions and access needed information and provides other services such as renewing their licenses, registering their businesses and getting needed permits applying for tenders which reduce costs and time and less red tape when processing applications. And the last interaction involves Governments to Governments (G2G), where governments provide other departments in the government with information sharing, easier access to resources, and service delivery.

E-governance helps reduce time wasted on paperwork and bureaucratic transactions, by allowing services to be conducted and completed through electronic transactions. As in the case of Botswana, as in many countries the use of e-governance improved the delivery of public services by allowing citizens and businesses to access online portals to get any needed government form to complete required transactions such as visa requests, residential or industrial license, work permits, health information and even pay their taxes online. (E-Governance. 2017)

III. Stakeholders and Participation

Governance is linked to several factors including collaboration and participation of citizens and stakeholders in decision-making processes, monitoring government services, and sustainability. Stakeholders' involvement and citizen participation are main

characteristic of Smart governance. For different levels of government to function, they should be able to work together and collaborate with other businesses and stakeholders as well as provide information and allow for citizens and other entities to participate in the decision-making process and public services (AlAwadhi S, Scholl H 2016). Smart governance can also be considered in technological forms such as social media, the internet, open data, and others forms of ICT, that encourage the collaboration between citizens and urban governments (Federici T, Braccini AM, Sæbø Ø. 2015) allowing for cooperation both across non-governmental and governmental departments and communities, creating citizen oriented operations and services (Pereira GV, Cunha MA, Lampoltshammer TJ, Parycek P, Testa MG 2017).

Smart City Stakeholders can affect the evolvement of smart cities in many ways, the influence they have, can be through direct and indirect means. In considering how to look at stakeholders, they can be classified into three types, Active, Beneficiaries and Affected Stakeholders, each with their own influence on the decision making process that affects Smart cities as a whole (Weyers 2017).

The Active stakeholders include the Citizens, they use the services and goods provided and they affect the standard of living and the cost of goods and services provided. There are the businesses that create or produce the goods and services that create the business opportunities providing their businesses in the city. There are the people who protect the city and its interests and defense, the Public Interest groups socially and environmentally. And we get to the municipalities that manage and oversee the city's administration that have an effect on its social and environmental development and its safety. Then there are the Urban City planners whose main aim is the citizens' interests and work on making sure the planning of the city is done accordingly. Another group of stakeholders are the Utility and public service providers who work on providing the most efficient public services for the city and its citizens. Then we have the internet based services provided by the Telecommunications providers whether private or public that affect the infrastructure and communication of data between stakeholders. Industries are also considered

stakeholders as they are the developers of the products and services needed in the city in mass amounts. The education system also includes stakeholders as the academic and research institutions help enlighten citizens about smart cities approaches and provide the needed research to achieve the level of smartness needed to create the idea of smart cities. There are the financial organizations that provide the investment, loans and other financial services for the city, the Cantonal and national agencies that govern the cities and their progress whether socially, economically and environmentally, and the organizations that monitor, coordinate, revise and amend the policies applied, the Standard Development Organizations, to allow there cities to achieve their needs are also considered stakeholders and they are considered very important, as are the consulting Companies that help cities reach their goals (Weyers 2017).

The ***Beneficiaries*** include the ***temporary inhabitants***, people who spend time in the city but don't live there who affect the cost of products and services provided. The ***Affected Stakeholders*** *can* include the citizens, the temporary inhabitants, the Public Interest groups and local businesses. The distribution and the communication of data and information to stakeholders can be very challenging to governments working on becoming smart cities. The process created to describe government transparency, service and information delivery as well as accountability in providing what the community needs and encouraging citizens to be part of the smart initiatives is achieved through E-governance. To simplify the relationship between stakeholders, they are divided into three types, government, citizens and businesses. The relationship and process created between each can be explained as follows:

There is the ***Government-to-citizens (G2C)*** e-governance, focusing on online and e-services using ICTs for communication. This form of governance allows government documents to be accessible to the people allowing them to conduct several tasks and transactions, tax payments, grant requests, vote online and contact city officials by direct messaging and such.

Then there is the ***Government-to-businesses (G2B)*** e-governance, focusing governments and their relationship with businesses. Providing businesses with access to needed

legislative regulations, information and advice, as well as providing easy access to all documents and forms that they require to comply with government regulations.
Then there is the *Government-to-government (G2G)* e-governance, mainly concerning the relationship between the government and its departments and municipalities and related officials and interactions online, this is beneficial to control costs of paperwork and communication time and overstaffing (Cortés-Cediel M, Cantador I, Gil O 2017).

There are many types of stakeholders, each with different interests, objectives, aims and roles to play in the city. Providing the best-suited form of communication process depending on the type of stakeholder and what they need is very important. Easy access, reduction of costs, transparency, accessibility, needed services, quick delivery of information and informative processes are needed to encourage stakeholders to adopt the smart city initiatives and processes applied.

IV. Private Public Partnership

Smart governance is also defined by the collaborations between stakeholders and becoming connected in partnerships to achieve the greater good is one way that cities have adopted when improving themselves. As Smart Cities grow, the importance of collaboration between government and the private sector through Public Private Partnerships (PPPs) is starting to be considered. For smart cities to put their ideas into effect, collaboration of both the public and the private sector is required. One area of focus is investment, even though not enough research is provided on this aspect, Public-Private-Partnerships also known as the three PPP or “PPP” has been considered to be the best solution to deal with public finance issues that impact Smart City initiatives (Calderini M, Marco A, Mangano G, Michelucci FV, Torino P 2013).

Using Public-private Partnerships is the best way to get projects done while involving all stakeholders, as Public-private Partnerships are made up of businesses from both the private and the public sector working under a contractual agreement and using existing resources while sharing the same risks, responsibilities and rewards to get the work done.

Involvement of citizens and the private sector in the early stages of a project is likely to reduce time and any failure in implementation that will show up in the future, as this can lead to having a final product that is not needed or used by the community (Interestor 2016). The involved projects that P3 work can be developing facilities requested to achieve the goals required for smart cities initiatives, they may include developing infrastructures, and with their efficiencies, work would be done faster, and projects completed on time, while the private sector would provide other means such as the land, the financing, the basic profits and such (Mulvihill 2017).

There is the partnership created to improve the quality of life of citizens by the European Innovation Partnership on Smart Cities and Communities (European-Innovation-Partnership 2012). The Strategic Implementation Plan (SIP) created the framework to be used in achieving a harmonious process that can be applied focusing on areas such as transport and mobility and ways to improve them, even focusing on freight and logistics transport to help shops and vendors get their stock and inventory on time. The SIP also included strategies for infrastructure improvement, citizen welfare, societal development and energy consumption as well as greenhouse challenges. All these strategies involve citizen, city planners, stakeholder, industries, businesses as well as financial institutions and many more. In order to implement this framework in more detail, the Operational Implementation Plan (OIP) was created providing goals, proposed action and implementation process to achieve the suggested ideas and providing each field of focus with the related strategy where related to transport and traffic congestion, or to citizens and healthcare and such (POLIS 2016). The OECD worked on the gap between the rich and poor, with support from the Ford Foundation, the Inclusive Growth Initiative was introduced in 2012, for governments to analyze the increase in inequalities and monitor living standards and the well-being of citizens in order to develop policies that can achieve equity and growth (OECD, THE OECD CHAMPION MAYORS FOR INCLUSIVE GROWTH INITIATIVE 2017).

In 2006, an approach that was applied by Cisco and some governments, that also involved several Non-Governmental Organizations (NGOs), other cities and companies, introduced the Connected Urban Development, (CUD) concept (Ferro E, Caroleo B, Leo M, Osella M, Pautass E 2013). This concept aimed to reduce carbon emissions by improving urban infrastructures with the use of network connectivity communication and technology. The aim of this initiative was to improve the delivery of services, control traffic congestion, operate public transport and create real estate models that provide energy efficient and sustainable environments. The first phase was collaborating up with three cities, San Francisco, Seoul and Amsterdam, which then expanded to include Madrid, Hamburg, Birmingham and Lisbon. This concept included one project that was the Connected Bus in San Francisco introducing the green transportation concept established by Cisco and the San Francisco Municipal Transportation Authority (SFMTA), where buses include wireless hotspots and Global Positioning System (GPS) system that allow commuters to know bus routes and connections status and related information. Another project introduced under the CUD initiative is the Smart Work Centers in Amsterdam focusing on transportation virtualization allowing citizens to work in nearby community centers without having to travel long distances to get to work. In addition, in Seoul the Personal Travel Assistant (PTA) introduced allows passengers to plan their trips within minutes from any connected device also providing green routes suggestions for passengers (Villa 2008).

There is the *Urban Development Plan* for Vienna Step 2025, focusing on public participation by providing administrations and businesses with guidelines to involve other stakeholders (Wien 2015). In 2012, in a joint venture between the government of Barcelona and private businesses, the *Connected City Mobile soft platform* was launched, applying a network of over 5,000 sensors of points of interest throughout the city that can distribute and collect information. This platform offers hyper-contextualized information related to different aspects such as city points of interest and touristic attractions information, transport information, city departmental information transparency, irrigation system information using sensors in the ground to provide data on humidity, temperature, and such (Laursen 2014).

V. Internet of Things (IoT)

Another technological factor that is one of the major tools that allows smart technologies to be used in an easy and costless way is the Internet of Things (IoT). Governance processes can be adopted easily with the help of IoT, since cities require sensors, networks and a way to connect everything to the internet to provide a platform that can access and monitor the applications and provide the needed processes as required, the concept of the Internet of Things has been created. This concept very simply explained is a network of connected devices, that allow appliances and other 'things' to be connected and exchange data, therefore without this ability to connect the devices together and allow for communication of data collection then stakeholder engagement will not exist, people will not be easily informed, processes will not be effortlessly applied. (Ismail, Information Age 2018) When it comes to applying smart initiatives in cities, being able to provide the most efficient and effective services available require proper governance methods and monitor sensors that can be used for buildings, streets, traffic congestion, electricity consumption, air control and citizen behavior, all require a form on communication and a way to connect them and be able to follow-up and continuously stay connected and this can be done with the use of the internet (Patil AS, Nadaf M 2017).

Such connectivity can be done with the use of sensors, networks, software, computers, smart phones and many other electronic devices. We can find IoT in almost every aspect of technology used by smart cities.

Water control with the use of IoT, cities can monitor how much water they use with the use of smart meters that can provide citizens with data about their water usage and water supply. This process can detect leakages, monitor how efficient the systems are and result in costly control when it comes to evaluating the systems.

In another area, IoT can be used to monitor traffic and traffic congestion as well as inform people, drivers, pedestrians and citizens who use public transport of congested roads or

closed roads, streets with accidents and better routes to take, other transportation options to use etc. In addition, the internet accessibility here can allow governments to monitor streets and roads through smart phones, road sensors and traffic cameras. Public transportation is disrupted whenever there are road closures, bad weather, or equipment breakdowns.

IoT is also applied on infrastructures and buildings, creating energy management systems and many other ways to reduce energy with the help of sensors, and devices that control heating lighting, cooling systems as well as fire safety control. In addition to all that we find cities working on ways to promote safety, this has also been implemented with the use of IoT. (IoT Innovation n.d.)

Using the internet to access the required information cities can benefit from to improve themselves allowed them to spend less in gathering the needed information, as internet can be accessed with the correct WiFi, 2G, 3G, 4G and the cost of applying these technologies costs less than gathering the information in old-fashioned ways. This process allowed cities to access more information, control their cities, avoid problems, encourage communication and performance as well as provide security of their people.

The IoT is made up of three layers, the Perception Layer, the Network Layer and the Application Layer. The Perception Layer is the physical part of the concept of IoT, it includes all the internet enabled devices used to connect to the internet in order to gather information, and exchange data, such as sensors, mobile phones, smart devices, tablets cameras, and Global Positioning Systems (GPS). The second Layer is the Network Layer, which is the layer that connects the physical devices to the internet allowing them to be received and transmitted to and from the parties involved such as the WiFi, 2G, 3G, 4G, Bluetooth and servers. The third Layer is the Application Layer which is the final stage where the data is transferred to and where information is received and processed such as Smart homes (Talari S, Shafie-khah M, Siano P, Loia V, Tommasetti A, Catalão JPS 2017)

There are many applications that have been used to help cities improve themselves making way for them to evolve into what is considered Smart Cities. Applying smart technologies and smart applications allow cities to solve many of the existing problems they have faced as a result of over-population, congestion, climate changes and waste management problems. With the help of application as the ones mentioned in the above paragraphs cities have become smart and have achieved better quality of living for their citizens.

3. The Vision of Smart Governance for Smart Cities

When we look at the mechanisms behind a city, we can break them into several elements. The environment, the people, the governing body, the services provided, the economy and existing infrastructure available. What makes a city unique is what it can offer its residents and what it can offer the world in general. In order to understand what each part requires; governments have always believed that they know best and that they follow what they believe is right according to a given agenda or set of available goals they have. But in many cases, governments are never able to achieve what they set their goals on and when they do, it ends up costing more, taking longer or affecting many other elements in its way. That is why having a structure plan, with clear goals that are aimed at improving city life, providing efficient and the best quality of services is greatly necessary.

With the introduction of Smart strategies and digital technologies, government officials have been able to better understand what the people need, where their limitations are and what their strengths are, and this has allowed them to find the required solutions for the areas that need additional work and major projects to improve themselves in. As the world becomes smart, and as urban areas progress with new strategies and systems, cities need to always stay ahead and continuously improve themselves. A goal set strategy providing continues upgrade and review is required for cities to embrace the concept of being “Smart”.

Taking into account stakeholders and their importance in a city community and their impact on the city's progress, services, businesses and communication, as well as encouraging participation and improving on the involvement of citizens and their opinions and being responsive to their needs is the key element that promotes the ideas of cities becoming Smart. In addition to inputting technological advances in areas that can aid governments in their effort to understand their communities and provide them with the best quality of life they can achieve.

With smart efforts and smart projects implemented, governments need to understand that governance need to be transparent and open and the ability to provide services that people need is more important than just re-designing cities and infrastructures. Having cleaner streets, organized transportation systems, proper law enforcement, safe communities, clean water, electricity availability, sewage treatments, good utilization of natural resources and efficient services provided, are what allows a city to advance. These initiatives and governance projects cannot be complete without assessment and evaluation. The outcomes of such projects can be short-lived or can have a long-term effect and in order to be successful, they have to continuously be monitored and maintained.

The vision of smart governance for smart cities involves having a digital technology and intelligent world with smart, safe, secure environmentally green and sustainable cities, planned, created, and maintained using advanced technological tools and integrated projects. These cities have a governance structure that is followed by governments to help provide high quality services and high quality of living allowing for collaboration and better communication as well as involvement of the community and other stakeholders of a city.

Smart governance can be applied in all areas of a city, having smart projects within the city's municipalities is vital. Governments can create smart projects that aid in reducing

their spending but encouraging or adopting investment plans, working on smart budgetary programs that can have long-term financial gains. In other areas applying smart initiatives in a city's administration and management system reduces waste of time and allows for better data collection and transparency through use of electronic systems, e-governance and applying ICTs in the proper areas. This allows governments to better understand their people and their people's needs. Applying security measure to secure the data transfer, data collection and data analysis of the information that governments collect is also conducted using smart governance measure with the use of open data initiatives.

Smart governance is not limited to data and information, but is implemented in communication methods created to encourage citizens to voice their opinions and ideas. For cities to become smart they should have a communication process with their communities and be able to listen and develop solutions for what their people need and want. In addition, Smart management involves creating a systematic process that follows and maintains the city's infrastructure, transport system, waste system and all on the ground factors that affect the city as a whole, and in order to provide the best services available, cities need to adopt the right governance tools to achieve that.

Smart governance cannot be successful without the participation of the community as a whole and without the involvement of all stakeholders and with the use of smart projects and initiative and technology such as social media, smart devices, mobile applications and other technological systems, a city cannot progress. Having a transparent and open communication system with the community is what allows governments to understand and provide what their community needs, cooperation and involvement allows citizens to provide their insights and get encouraged to be involved thus allowing governments to collect data and information easier and provide the right solutions in the right areas that benefit all stakeholders and the city as a whole.

This smart governance involves using systems and networks comprised of databases, sensors and information to be distributed and maintained through ICTs and advanced tools to citizens and applied in different areas of the city. In turn, these ICTs will allow the sharing of information between governments, the citizens and other stakeholders, as well and encourage communication and involvement in decision-making, in addition networked sensors will be available around the cities allowing for the detection and monitoring of any fire, earthquakes or relates matters that can be avoided or warned about (Scholl, H. J., & Scholl, M. C 2014)

The vision set for having a smart city aims to create a city that can manage itself through smart governance in different sectors such as the environment, air, water, and green spaces policy context, to make sure that they are managed in a clear, ideal, efficient and advanced framework. With the help of the new and advanced technologies that are being created and with the use of technology and smart platforms and systems the governance process has improved greatly.

Chapter Summary

The Chapter talks about how having good governance to achieve sustainability is vital in Smart Cities, and many organizations and tools have been developed to apply a governance structure that suits each urban environment according to what it needs. Each aspect of governance has a specific aim but they all follow one pattern, achieving a smart city. Good governance is composed of several elements as discussed in the previous chapter and when applied properly these elements would make any city succeed in providing the best quality of life for its people. as Smart governance can be found in many areas of community life, with the right policy and project applied it can be used to provide solutions and improve the quality of life. When it comes to citizens, smart initiatives should concentrate on available healthcare, safety, efficient and effective

public services, better and easy access to education, social cohesion and better housing and residential availability as well as better quality of life.

The chapter then explains how there are many Smart governance approaches that aid in the implementation of Smart initiatives, and have been adopted by many cities, successfully allowing them to become smarter, improving their policy implementation, coordination among their bureaucratic departments and agencies, reducing the challenges of over-population, congestion, air pollutions, education, healthcare and many related factors. Creating the best suited approach involves understanding what a city needs and what it requires to improve it and to allow it to grow and progress.

Such approaches include Information Communication Technology, also known as ICTs makes up the structure or process of using technology and communication to interact in what we now consider the digital world. ICTs include all technological components such as network systems, computers, smart phones, and other electronic devices, in addition to other applications and systems.

The chapter also discussed that as governments try to improve their services in various segments of their cities, they need to upgrade their services in all areas, and providing e-governance applications is necessary in areas such as healthcare, education, transportation, and many more. E-governance helps reduce time wasted on paperwork and bureaucratic transactions, by allowing services to be conducted and completed through electronic transactions.

Another approach involves Stakeholders and Participation as governance is linked to several factors including collaboration and participation of citizens and stakeholders in decision-making processes, monitoring government services, and sustainability. Stakeholders' involvement and citizen participation are main characteristic of Smart governance. Another approach is Private Public Partnership Smart governance is also defined by the collaborations between stakeholders and becoming connected in

partnerships to achieve the greater good is one way that cities have adopted when improving themselves. the importance of collaboration between government and the private sector through Public Private Partnerships (PPPs) is becoming a major issue. Internet of Things (IoT) is another technological factor that is one of the major tools that allows smart technologies to be used in an easy and costless way, it is very simply explained is a network of connected devices, that allow appliances and other 'things' to be connected and exchange data.

The next chapter will provide an epistemological view of the thesis in all and how the idea of smart cities, smart governance and smart initiatives are considered to have a major impact on the future, in the researcher's opinion. Understanding the need to learn more about smart elements and principles and the different types of governance and the different concepts involved would help the reader understand the need to apply an assessment tool when creating smart cities or smart projects and with the help of the research conducted on Beit Misk, this allows the reader to have a clear idea of the research process involved.

Chapter 5: Epistemological Posture & Methodology

1. Epistemological posture

This thesis provides a general idea of Smart Cities, the various factors that make such a city grow and succeed, mainly focusing on Governance, and the effect of Governance on the way a Smart City should apply innovative measures and provides a way to assess these measures.

When we consider Smart Cities, we acknowledge the use of technological advances and governance concepts in allowing cities to improve themselves. As an epistemological posture, smart cities are successful due to the governance tools and concepts used. In order to see how this theory is correct we provide a breakdown of information that starts from explaining what cities comprise of, the challenges these cities face in different areas of living, how governance can aid in improving these cities, and how smart cities are being adopted and the different applications and components that make up smart cities and then we provide different areas of focus that cities can work and improve on to achieve the status of becoming Smart through adopting and implementing smart governance and the tools to improve and solve the challenges they face.

With the use and review of articles and journals collected from various sources, the researcher concludes that without the application of advanced solutions and management structures, many smart projects and solutions would not have been launched and encouraged by governments and stakeholders. The intentions behind this thesis are to shed light on the University Governance Screening Card and its importance in helping Smart Cities. After reviewing this tool and realizing the huge impact it would have on the success of smart cities and smart project, working on a document that can highlight this importance and allow readers to see the value of assessing and evaluating the path smart cities take to continuously advance and grow seemed as the appropriate step to take. (Bulinge 2010)

2. Understanding the Testing Process

Discussing the different approaches and methods used in Smart Cities is very important as there is no one way of developing and improving a city. Other than the fact that each city applied solutions and improvements that suit its needs, we find that cities have different visions and goals that require different innovative strategies and plans.

The researcher understands the importance of advancement of cities and the process it takes to achieve them, and therefore suggested the application of University Governance Screening Card, mentioned below, as the best type of evaluation test. In order to help cities succeed in their application of the different types of methods and in order to allow these cities to understand where their weaknesses were and the way to calculate and work on improving themselves, this Screening Card was suggested as a clear project that helps cities.

In order to understand how the research was conducted for this thesis, it is important to take a constructive stance. Using a constructivism approach focusing on the qualitative and the quantitative aspect of the research detailing each step and question asked, the researcher provided examples on every topic and included answers to follow these questions, providing a clear view of how the process can allow us to better define our situations when using this method. (Dumez 2010) In the research work conducted, there were many views and opinions on the different topics found in this thesis, therefore taking all the different explanations and opinions and definitions used by different practitioners and using examples of smart initiatives provided and applied from different countries has allowed the thesis to include almost global opinions and thoughts. With this information collected, the researcher's interpretation of the situation he has considered provided the certainty that a tool is definitely required to assess so much opinions and thoughts of smart cities.

In order to understand this testing method better and allow each process to be understood and explained properly, the researcher applied it on a newly created Smart City and applied each step in a detailed way. Using the Smart City example and following the different

stakeholders involved and interviewing them and understanding how the city was build and why and the vision behind it, allows the reader to fully experience the process of testing and the stages and areas of focus that can be applied when using the Screening Card.

Data selection included articles and literature on the different views given about Smart Cities as well as the different approaches and initiatives adopted by many countries. The articles also included the types of Governance approaches and tools used. The research strategy adopted was to review related articles and journals and research Smart Cities and their concepts with governance methods. The main data collection techniques used in this research study was documentation collection, analysis, literature review, and the observation of a live Smart City initiative created in Lebanon, which will provide the practical aspect of this thesis and which will be the variable used to adopt the suggested governance tool explained in this document.

The collection of different views and concepts that provide useful information ranging from all areas that affect cities have provided us with enough insight to make our stance. And with the help of qualitative and quantitative approach in our research and the experimental projects conducted on Beit Misk, which will be discussed in the next chapter, we were able to conclude the need for smart cities to have the right governance approach with the right assessment tool that can help cities evaluate their progress.

As cities face their challenges and work on providing the needed solutions that can aid in creating better quality of life for their citizens, we find that the need to maintain these solutions is vital. With smart approaches and initiatives cities are becoming smarter and expanding and achieving successful outcomes, but if these smart projects aren't followed through and continually assessed to make sure they are achieving their targets, then these successes might be short lived. That is why adopting an evaluation tool is important and it allows cities to understand where they need to improve and what they need to change and the importance of the governance structure used.

The University Governance tool discussed was created for universities providing an understanding of a small community, its characteristics, its governance system and the elements it lacks and it needs to improve on. In an attempt to provide actionable knowledge to cities and governments on the use of this screening card in allowing them to evaluate what areas of focus they need to concentrate on to improve the tactics and smart initiatives they implement and what areas are successful, the researcher used the next Chapter's case as an example to demonstrate the screening card's achievement. (Martinet 2005) The next chapter provides a case study applied on a community with smart initiatives and smart projects in order to identify what the UGSC can help us achieve and how we can understand the progress that smart initiatives can result in and also provide a study of the process applied using the Governance Screening Card showing concrete results that support the theory of the need to use this tool to assess a city when applying smart projects and smart initiatives to it. (Rispal 2015/8).

3. Methodology

As Smart City approaches seem to increase to try and effectively maintain the rapid urbanization phenomenon that has risen in the past few years and as a result of the limited academic literature available this thesis has been created to provide an insight on Smart City approaches and to try and provide a system to understand these approaches. Based on the study of a wide and extensive collection of literature from various disciplinary areas, we identify several tools that can help in testing governance and other Smart city Elements to achieve the best results and to allow for different approaches to be considered or applied for improvement.

This thesis proposes the application of Governance tools, specifically University Governance. University Governance which embodies how higher education systems and institutions such as universities set their goals, how they implement and manage their academic programs,

how they maintain the student life, as well as preserve and uphold other areas such as the structure, finance, and human resources divisions; it also includes how these institutions monitor their accomplishments and results. Since this type of Governance affects the success and the quality of these Educational institutions, it has been suggested that a need for a benchmarking tool is needed to assess to what extent these institutions follow good governance practices that would allow them to achieve their institutional goals. This focus has been on the Middle East and North Africa Region and the tool introduced is the University Governance Screening Card (UGSC).

The data and information used was collected from articles and literature on the different views given about Smart Cities and smart governance as well as the different approaches and initiatives adopted by many countries. The research strategy adopted was to review related articles and journals and research Smart Cities and their concepts with governance methods. The main data collection techniques used in this research study was documentation collection, analysis, literature review.

The research conducted can be considered quantitative as well as qualitative, as it also include the observation of a smart city in Lebanon, gathering data through focus groups and interviews and gather information and data to fill the questionnaires related to the Governance of Smart Cities. The input of all stakeholders involved is a key element in understanding how Beit Misk operates and how smart this community is made out to be and how important participation is.

4. University Governance Screening Card (UGSC) tool (World Bank, 2013)

Even though there are many types of governments, which are affected by many varying factors, how governments are managed, is a key element affecting how successful they are in providing what their community needs whether that includes providing a safe culture,

political tranquility and economic accomplishments. Just like governments, educational institutions are faced with the same conditions. In all institutional developments, it is important to have transparency and openness in all kinds of processes, decisions and expenses provided to the parties involved. Governments, businesses and financial agencies are not the only institutions that would benefit from such openness, educational institutions would benefit too. Educational institutions are considered small forms of communities with their own traditions and cultures and goals, so just like governments, there is not a specific type of governance model applied to all.

Higher Educational institutions have a great effect on the economy and social aspect of a city through producing well-prepared individuals who can adapt to any situation and can apply new technologies and ideas needed to improve the areas they reside at. They provide the talent pool, encourage knowledge distribution and promote citizen participation by helping the young generation develop their skills to be prepared to be part of the global environment and by encouraging creativity and innovation and social mobility, play a major role in fostering innovative and skilled leaders and citizens (World Bank 2009). The Middle East and North Africa (MENA) region needs to strengthen its technological stance to create higher value-added goods and services in order to compete with the global market, and to provide such services an educated pool of graduates who can face the global changes should exist. If graduates do not have the required qualifications and skills to be hired, they risk not finding employment, but Higher Educational institutions provide better chances of employment and higher earnings.

Therefore, as the world started to face an increase in higher educational systems, students in the Middle East were worried that the existing educational systems were not at the same level as international institutions. To try to provide some form of testing to measure governance and the quality of service provided by these institutions, higher education leaders and educational policy makers voiced these issues at the Center for Mediterranean Integration (CMI) in Marseille, in 2009, in an effort to try to create a solution to benchmark university governance. In response to these concerns, the World Bank MENA Regional

Program on Higher Education developed a Governance tool to help these educational institutions monitor their progress and to see if they are achieving their set goals by assessing their governance practices as well as any changes introduced to these governance practices without following a specific form of governance. This tool also allows these educational institutions to examine themselves in comparison with universities worldwide to see if they are in the same levels as international institutions, and takes into account the institution's transparency and openness as well as its accountability and the level of stakeholder participation provided in decision-making.

The tool introduced was the University Governance Screening Card (UGSC), which was created while considering other benchmarking tools worldwide and was developed by the Committee of University Chairmen (CUC), and the Governance Guidelines reviewed by OECD. It provides several features such as:

i. Identifying strengths and weaknesses at individual institutions;
ii. Identifying governance trends at the national level;
iii. Identifying governance trends and practices by type of institution; and
iv. Generating interest in initiating reforms at the institutional, national, and regional levels.

With Globalization and the increasing mobility of students, universities are facing many challenges adapting to such a large pool of diverse candidates and global requirements. Universities have had to work on their educational offerings, their missions, their services, their governance process as well as adopting new reforms and although top worldwide universities do not focus much on their ranking, but many other universities especially in developing countries started to work on their ranking.

A report was created in June 2013, by the World Bank called the "UGSC Benchmarking Governance, as a tool for promoting change, 100 universities in MENA paving the way", using

the UGSC tool to show the assessment and comparison of governance in 100 higher education institutions (HEIs) in seven countries in MENA region, applying the UGSC tool.

Many universities in the MENA region participated in the University Governance Benchmarking tool implementation, which aimed to identify the governance practices applied by universities in the region and create a framework to analyze and compare university governance. It focused on developing a reference point, to guide the progress of change and reform by helping universities know the strengths and weaknesses of the governance processes they follow and easily find out what areas need additional improvement. Applying this tool on educational institutions, has created the foundation for regional and global benchmarking exercise providing a way to link governance with other areas such as policy development, performance, admission, skills development, innovation, and a few other areas. The results on this tool helped universities in the area become aware of the need to produce, collect, and distribute performance-related information. This tool has mostly assisted universities in the MENA area, allowing them to understand the university's system and figuring out how to improve their operations in comparison to International standards, and help them develop their own goals and assess the progress they achieve when following these improvements. This tool can identify several areas of importance that can be evaluated and monitored such as the institution's strengths and weaknesses, the trends followed, at the national level; the practices applied depending on the type of institution and can also encourage reforms application at the institutional, national and regional levels.

The USGC project was implemented in 100 universities from all over the MENA region. In 2011 data was collected from universities in Egypt, Morocco, Palestine, and in the following year it was collected from Tunisia, Lebanon, Algeria, and Iraq. A sample was developed divided by size, location, date of creation, and legal type to show the diversity of each institution for each country except Lebanon as many institutions took part on a voluntary basis.

Each university was classified as Private, Private For-Profit, and Private Not-for-Profit, and separated according to their type, General, Specialized, Religious or Open. Their size was considered according to the average enrollment per country where medium size universities were defined as those within one standard deviation of the average enrollment in the country; below medium defined as small; and those over one standard deviation of the average were defined as large. Their locations were divided by capital cities, intermediate cities and small cities and universities were considered old if they were older than the average enrollment age and recent if they were recently built or were younger than the average age of enrollment. The number of students per university ranged from a population of 1.9 million to a population ranging from 65,000 to 180,000 students.

Since UGSC, focuses on governance practices, certain areas of governance are highlighted which include The University Governance Scoring Sheet (UGSC) is a tool created to benchmark university governance, to be able to analyze educational institutions' governance process. It gathers information from universities to try and have better understanding university governance at the institutional level. This tool consists of around 50 questions relating to five dimensions of governance to see how a university functions through its governance and how the university operates. These dimensions include (InstitutionalResearch n.d.):

I. Overall Context, Mission, & Goals: this includes the complete framework that the institution, smart city, university or organization is composed of and how it is linked to its divisions and departments. It is important to have a clear and definite mission and goal that can be followed by all parties. The stakeholders involved in this dimension would include the heads of the organization, the officials in charge, the decision-making body or the government itself.

    a. Having a clear mission that is aligned with the goals to be achieved would provide a clearer path that can be followed and would allow for a better way

to monitor the progress done at different stages to evaluate the organization or government's achievements to date.

II. Management Orientation: this dimension includes the daily decisions and operations of the institution. This dimension focuses on the managing staff their duties and responsibilities, the accountability measures in place, and assignment timeframes and deadlines. Considering the plan followed by the institution or organization and the process followed to achieve them. This would include the assessment reports and processes used to evaluate the achievement of the organization or government and how it is working to achieve its goals. It includes the process used to select the stakeholders involved in the management process and decision-making process, such as elections, through a committee and such, this dimension also includes the managerial profiles, the job specifications, and how their responsibilities are distributed. It also includes evaluation of staff and employees, their salaries, their compensations and all related management processes

III. Autonomy: this dimension focuses how the institution or organization has autonomy and is independent and self-governed. Having the ability to set their own regulations and internal strategic plans and programs and projects and how external interference is non-existent or very limited, is an important factor.

   a. It also includes having autonomy financially, has investments, does not have a deficit, for example in a university it would mean being independent financially and not affected by student fees and how the institution set tuition fees, borrow money, invest money and how they get and to deliver contractual services and such factors

IV. Accountability: this dimension of governance refers to the accountability of the governing body, the decision-making body, the officials and what they have achieved from the goals set by the institution or organization. It includes the evaluation process

and how the performance of the stakeholders are assessed and evaluated. In addition to this there is the asocial responsibility that each organization holds towards its surroundings.

a. In order to identify how accountable an organization is can also be seen on the sanctions and

V. Participation: This dimension will analyze to what role stakeholders play in the decision-making process. Although this depends on the type of institution, organization and government as well as on the overall framework of the system, stakeholders usually will include anyone who is involved or affected by the organization and the decisions it makes.

a. Participation will include different types of parties and the level of involvement on their part in the decision-making process, in the services provided, on what they want and if their needs are taken into account.

This tool provides a lot of information about governance and management procedures and to provide better results and differentiate between each components principal component analysis (PCA) was used that focuses on two areas one on how much autonomy universities have, and how flexible their goals and legal structures are; and on how effectively managed, participative, and accountable universities are.

The main contrast observed among universities in the study sample was on the Context, Mission, and Goals, Autonomy, and Participation dimensions. This separation resembles to the divide between public and private universities, besides the “Good Governance” group, the study classified the two main groups as either “Public University” or “Private University” groups. Within each type, there were three governance models that distinguished them from each other. For Public University, groups there were the Traditional Public universities that were categorized as centrally driven with low autonomy levels and high participation levels found in Algeria and Tunisia. Then there are the Public with High Accountability universities with high results-based management and autonomy levels, found in Algeria, Egypt, Morocco,

and Palestine. Then there were the Low Governance Public universities that showed low goal oriented with low performance management policies and low social responsibility levels. For Private University, groups there were the Private Participatory universities that were categorized with high levels of participation and low accountability levels. Then there is the Private with High Accountability universities with low mission oriented levels, slightly low management levels, and high accountability levels. Then there is the Low Governance Private universities that showed low accountability and participation levels.

The UGSC was created to examine one main factor in universities, governance, and how governance is applied and followed in universities by breaking it down to the five dimensions mentioned earlier and comparing that with how the university should operate. This process helps identify how in line universities are to their goals and how aware they are about the way they govern or manage their institution. (World Bank, 2013)

When applying this Screening Card in smart cities, we can assess the level of "smartness" achieved in comparison with the goals and mission of the city and how much progress it has achieved. This tool focuses on five main governance dimensions that are the major elements needed to know how effective a city is and what it lacks or what it needs to improve on.

5. Smart City/Community Governance Screening Card tool

The following example is of how the Screening Card has been applied in a smaller version of a city, a university and how the process applied are created, implemented and followed. Using this tool allows smart cities to evaluate their projects and the initiatives they adopt and test how successful and effective they are and allows them to understand in what areas they can improve themselves.

A University campus serves like a miniature city with both having a community that requires constant improvement and protection. They both have health coverage, residential and commercial (academic or Office) infrastructure, athletic arenas, parking space, water and energy facilities, stakeholders, investments and so on. A University can serve as a perfect testing ground to monitor the implementation of smart initiatives, policy adoption, governance and better management; and evaluate and apply corrective actions where needed, therefore cities can invest and benefit from universities when considering Smart innovation goals.

In another aspect, Universities also provide the foundation for students, to understanding and adopting smart initiatives, through becoming more connected, providing technological innovations, accessible labs, teaching spaces, and introducing new styles of teaching and apply technology in areas such as parking, lighting, security, WIFI accessibility and managing their energy and water better as well as apply smart initiatives to their infrastructures. Universities cannot exist without the digital and technological practices they have adopted into their institutions. Technology is found in almost every aspect of a university such as the websites that students follow up, the administration systems, the virtual systems used in lecture halls, the teaching and learning models and the infrastructure and communication.

To achieve strong resilient cities, it is important for cities and universities to join together in the development of the infrastructure and services of the Smart approaches as their actions have direct impact on each other and both have similar goals. This means, while universities focus on students and teachers, cities focus on investment and public services; which will result in better services, quality of life, infrastructure, planned investments and many other aspects, for both.

Three areas that universities focus on in order to become a smart campus includes, looking at themselves as a small community or city with their own values, challenges, services and goals; creating a community of connectedness which is the use of technological based systems on campus features, and areas such as lighting, parking, visual teaching aids, student

interactions and communications and other related factors; and investment in infrastructures and services and the use of their physical and digital assets to improve themselves.

Chapter summary

This chapter discussed the Epistemology and methodology aspects of the thesis, where and how the information was collected, how the research was conducted and what the case study involved. Additional information regarding the research will be mentioned in the next few chapters for more details. The chapter provided certain insights into the style of interpretation and collection of data made and provided an insight on the reason behind focusing on the University Governance Screening Card tool as a way to assess Smart Cities.

The chapter explains how the Screening tool was created and the evaluations it provides. As the world started to face an increase in higher educational systems, students in the Middle East were worried that the existing educational systems were not at the same level as international institutions, so the World Bank MENA Regional Program on Higher Education developed a Governance tool to help these educational institutions monitor their progress and to see if they are achieving their set goals. Many universities in the MENA region participated in the University Governance Benchmarking tool implementation, which focused on developing a reference point, to guide the progress of change and reform by helping universities know the strengths and weaknesses of the governance processes they follow and easily find out what areas need additional improvement.

The tool was developed by the Committee of University Chairmen (CUC), and the Governance Guidelines reviewed by OECD. It provides several features which included Identifying the strengths and weaknesses at individual institutions; Identifying governance trends at the national level; Identifying governance trends and practices by type of institution; and Generating interest in initiating reforms at the institutional, national, and regional levels.

The areas of focus that the tool focused on and tested included several factors such as the Overall Context, Mission, & Goals of the organization, the complete framework that the institution is composed of and how it is linked to its divisions and departments as well as the missions and goals that it follows. The tool also looked at the Management Orientation of the institution such as the daily decisions and operations of the institution, the managing staff, their duties and responsibilities, as well as the accountability measures in place, and assignment timeframes and deadlines. Another point that was tested was Autonomy, to see if the institution is independent and self-governed and is able to set their own regulations and internal strategic plans and programs and projects. In addition, it looked at the institutions' Accountability of the governing body, the decision-making body, the officials and what they have achieved from the goals set by the institution or organization. As well as the Participation considering what role stakeholders play in the decision-making process.

In the next chapter the researcher will provide a case study of how the Screening Card has been applied in a smaller version of a city, a university and how they process applied are created, implemented and followed. Using this tool allows smart cities to evaluate their projects and the initiatives they adopt and test how successful and effective they are and allow them to understand in what areas they can improve themselves.

Chapter 6: Case study

With the help of the above-mentioned tool, other areas of Smart City approaches can be tested. The Smart City test proposed in this thesis describes process that will help stakeholders and participants understand how smart city approaches operate.

1. Beit Misk

In order to test the adapted tool, the researcher had the opportunity to find **Beit Misk**, a relatively newly established smart city/community in Lebanon. Beit Misk has the potentials of becoming one of the leading smart cities in the region, promising its stakeholders with smart environment, smart economy, smart living and smart governance, objectives that are SMART (Specific, Measurable, Achievable, Realistic and have Time line) and that can improve the quality of life.

> "Aspiring to be a role model for modern villages across the world, Beit Misk incorporates the beautiful landscape of its location into its very fabric of life, forming a countryside residential community with the traditional aspects of Lebanese villages, such as piazzas and stairways, in order to reproduce their pleasant atmosphere. The project will comprise villas, townhouses and apartments buildings to suits everyone's need" (BeitMisk n.d.).

Beit Misk is a dream made true by Mr. Georges Zard Abou Jaoudeh, a man who believes that Lebanon is a naturally made platform, which can withstand challenges and provide excellent outcomes.

Located just a scant 18km drive away from Beirut, in the Metn Area, Lebanon and situated within a countryside residential environment at an altitude ranging from 600 to 900m above sea level, covering around 655,000 m2, Beit Misk overlooks the sea, offering a splendid view of the Mediterranean and the capital city of Beirut. The project is divided into 10 phases,

which are composed of villas, apartments, parks, green zones, leisure facilities, retail outlets, country club and various other sections. This development included several companies responsible for different parts of the project. The companies managing the project are *Highland*, the company that worked on the design and construction was *Handico*, and *Beit Misk Facility management* handles all the facilities aspects of the project. One of the collaborators of Beit Misk was Ogero, Lebanon's national operator, were responsible for implementing the Internet of Things (IoT) network throughout the community, working with Data Consult in providing innovative solutions in all areas of the city and using their data-based platform.

This community is a great example of how smart elements are applied. Smart governance and smart applications are implemented in every corner of this city to provide the best smart services that it can offer for its residents, as the chairman of the project explained, "Our residential project is tailor-made to meet the actual needs and outlook of the buyers," he said" (Habib 2014). The concept behind Bet Misk is allowing people to feel at home in an area that creates the best quality of living possible for its citizens and in order to achieve this, almost all the smart city concepts are found in this community.

As a country that has been facing a lot of instability and problems of waste management and poor air quality control and misuse of natural resources, having a new idea implemented in a city that can be an example that the rest of the country can follow is a major step for Lebanon.

Beit Misk can incorporate all the smart city concept that can allow it to be the best example of quality of living in the region. In areas of Smart Environment, the community was built in an area surrounding itself with a natural forest (BeitMisk n.d.). And creating remarkable landscapes that preserve Lebanon's traditional sights of the country's villages and town squares while providing areas for jogging and bicycle paths (Emaar n.d.). As advertised on its Website, Beit Misk has worked on its air-quality providing its residents a Pollution-free environment with clean streets. Providing sensors that measure the quality of air particles

and the levels of different gases in the air for citizens to be informed continuously on the air situation around them is another plus for the community (Nader 2017).

The projects first required digitalizing the city, its infrastructure, its utility gauges such as the gas, water and electrical meters, sewage treatment systems, oil and water reservoirs, water pumps; When considering Smart Living, this project is filled with ICTs and sensors and data collection programs that are a major factor in Beit Misk, focusing on understanding what the community needs and maintaining a stable environment. Even the fire alarms and security systems were deployed with sensors and any other element that required digitalization. All these elements were then connected together using a wireless network connected by a base station from Cisco, that gathers the data collected from the sensors into ThinkPark, a platform, provided by another leader in its field, Actility. The monitoring of the sensors on the meters and systems were then conducted in the technical room of each building (Nader 2017).

Unlike the entire country that is facing problems with electricity and water, at Beit Misk the electricity is available twenty-four hours a day with water and gas available around the clock as well. And in order to provide a safe environment for its citizens, Beit Misk provides security day and night.

Another concept of smart cities applied in Beit Misk is Smart People. The idea of the distributed sensors and smart application developed, allows the city's maintenance and facility team to observe the community. This process was also created to communicate with the stakeholders of the community. The monitoring of the sensors and their results aimed to provide data about every aspect of the city that was gathered and stored on the platform created by Data Consult, the Data Orchestration Platform, inputted into Google Cloud. This in turn provided facility managers with the analytical data they need to supervise the whole project, helping them concentrate on managing the resources of the city and improving the residents' use of them.

On the other hand, for the citizens, a Smart City application relating to Beit Misk was created to communicate with the residence on everything they need to know, allowing participation and communication to take place, allowing them to be aware of their effect on the community. To make sure that the data collected is safe the secured software and dashboard are used are protected by an authentication mechanism using Google Single Sign-On (SSO), with everyone having a secure login access (Actility 2017).

In order to apply the concept of Smart Economy, Beit Misk communicates and collaborates with all stakeholders and outside parties and encourages public and private sectors involvement and builds a community for everyone who visits. It usually creates recreational and family events and festivals such as Santa's Factory festival, lunch events for the summer (Beiruting 2014) (Dent 2018), summer camps in collaboration with kids' centers, as well as events such as concerts and even film festivals (Libelium 2017).

2. Beit Misk Conducted Research

In order to conduct a thorough experiment and observational insight to the community of Beit Misk, the researcher met with the main person responsible for the project's creation and implementation, Mr. Georges Zard Abou Jaoudeh. After clarifying to Mr. Abou Jaoudeh the reason behind this thesis and the importance of governance in a city/community, Mr. Abou Jaoudeh showed great interest in the topic and introduced the researcher to the decision-makers team at Highland and Handico.

To be able to test the community of Beit Misk, the researcher needed general and specific information about the community and the work put into it and a questionnaire had to be filled out that included the essential data, to carry out his research. After conducting several meetings, with the General Manager at Highland Mr. Ghassan Haikal, and the Assistant General Manager at Handico, Mr. Camille Abi Rached, the researcher was able to gather

enough information and data to fill the questionnaires related to the Governance of Smart Cities. (Analysis provided after the focus groups).

The input of all stakeholders involved is a key element in understanding how Beit Misk operates and how smart this community is made out to be and how important participation is, therefore, in order to make it viable, the focus group is made out of all the stakeholder who took part and continue to take part and live and work in this community as result we created three different focus groups depending on the type and relationship they had with Beit Misk. The next step involved conducting a focus group discussion with three categories of stakeholders.

1. Focus group composed of residents at Beit Misk
2. Focus group composed of suppliers and consultant working with Beit Misk
3. Focus group composed of technical and administrative staff working at Beit Misk

The focus groups were each interviewed and at each session the participants, were asked to fill an attendance sheet and include in it their contact information, their name, telephone numbers, and email addresses, as shown in Appendix A. The interviews were also recorded with the consent of the participants using a tape recorder.

The reason behind the thesis was explained to the participants, as well as the importance it has to Beit Misk and the significance the information provided would have on the improvement of governance on the community of Beit Misk. The sessions were very straightforward allowing questions to be asked at any moment and the researcher expressed to the participants that the interviews could be stopped whenever they preferred. Conducted in the conference room provided at Beit Misk in a round table setting with comfortable seats, the whole atmosphere during the sessions was easygoing, comfortable and open.

3. Beit Misk Data Collection and Analysis

The Data collected for the thesis was gathered from more than one source, mainly the stakeholders involved with Beit Misk. The stakeholders selected according to their influence on the project, their major involvement and the influence performed by Beit Misk on the stakeholders.

- Highland refers to the initial owner of the land. Highland is until the present day is playing the role of the strategy maker and the ultimate decision maker.

Highland in the analysis is represented by Mr. Ghassan Haikal (General Manager)

- Admin/Tech refers to the administrative and technical staff working at Beit Misk including Highland and Handico (Handico is the facility management company providing all facility management products and services)

- Residents are the citizen living in Beit Misk, they are owners of houses in Beit Misk.

- Suppliers, Consultants And Subcontractors refers to external suppliers of products and services including but not limited to security, fuel, electricity, internet, landscaping, construction,…..

The data collected was provided by, through the previously mentioned focus group from the Residents, the Technical and administrative Staff, the Suppliers, Consultants and Subcontractors, as well as the Company that is the initial owner of the Land on which Beit Misk stand upon.

In regards to the information collected from Highland, a first meeting was conducted with the CEO of Highland, Mr. Georges Zard Abou Jaoudeh. Mr. Abou Jaoudeh provided the researcher with an explanation about the idea of this project, the dream behind Beit Misk, what inspired him to pursue it and what his vision for it will be.

After the interview with Mr. Abou Jaoudeh was complete, he introduced the researcher to the General Manager of Highland, Mr. Ghassan Haikal and the Assistant General Manager, Mr. Camille Abi Rached. Mr. Haikal and Mr. Rached provided all the additional information that the researcher needs that might help in the thesis.

It was then that the approval was given on conducted the above-mentioned focus group discussions, which were considered a good step in strengthening the assessment of the governance at Beit Misk.

When the focus groups were selected, the process was conducted randomly and the participants were divided into the three mentioned stakeholders.

4. The Questions

As described in the Section on the UGSC, this tool focuses on 5 dimensions, and the questions used in this project aimed at providing answers to these same dimensions as seen by stakeholders residing, communicating and working at Beit Misk.

These dimensions include:

- Overall Context, Mission, & Goals: this section focuses on the vision of Beit Misk and what has been incorporated to achieve the goals it aims for. This can include the body or framework created and the involvement of the stakeholders in this process and how familiar they are to it as well as their information of the aim of the city and where it is heading.

- Management Orientation: this section involved the plan designed for Beit Misk and how stakeholders are involved in it. It involves the decision-making process in all aspects of the community, from the lights included on the streets to the employee's salaries as well as events conducted and facilities created. To measure this process, performance appraisals are also developed to have a clear idea of the decisions made and how effective they are in order to create accountability procedures that the officials of the community must abide by, it also involved creating a framework

- Autonomy: this section shows how independent the community is. It focuses on the process of financial systems and how is responsible for the process implements as well as the recruitment and programs applied in it. Understanding who is accountable for what is very important in having a clear idea where the community is headed and knowing how independent it is as each field is handled by different departments is a key process to know.

- Accountability: in this section, breaking down the community into different fields or levels while making everyone feel that they are all involved and they are all

accountable, being involved as a whole allows for social responsibility to be tested and financial integrity to be encouraged.

- **Participation:** This section analyzes the involvement of all stakeholders in the community's decisions and how they are represented and on the areas of involvement.

The main questions asked were:

1- Questions related to the 1st axis (Context, Mission and Goals):
   a. Is there a mission for Beit Misk and who participated in elaborating it?
   b. Are there goals set for Beit Misk and who participated in elaborating it?
   c. Is there a legal framework or Beit Misk and who participated in elaborating it?

2- Questions related to the 2nd axis (Management orientation):
   a. Is there a strategic plan at Beit Misk and who participated in elaborating it?
   b. Is there a process for selecting decision makers at Beit Misk?
   c. Is there a performance appraisal process at Beit Misk and who manages it?

3- Questions related to the 3rd axis (Autonomy):
   a. What about the quality of life at Beit Misk?
   b. How are human resources managed at Beit Misk?
   c. Who manages the financial process at Beit Misk and how?

4- Questions related to the 4th axis (Accountability):
   a. Is there a quality management system implemented at Beit Misk?
   b. Are there social responsibility initiatives at Beit Misk?
   c. What do you think of the financial integrity at Beit Misk?

5- Questions related to the 5th axis (Participation):
   a. Representation and impact on decision making process

5. The interviews

Below are the findings of the interviews with the Residents

Focus group 1 (Residents)

The session was conducted in around 60 minutes and it went very smoothly with all parties getting involved. At the start of the session, the participant's contact information was collected, a general explanation about the thesis was provided and the mission behind the thesis was explained to them. Some of the participants wanted a definition of Smart Cities, which the researcher provided, explaining that there is yet to be a worldwide agreed upon definition of Smart Cities, and that no specific explanation has been given, but that officials, practitioners and academics all agree that it 's main aim is achieving better quality of living while respecting the confidentiality, security and safety of the concerned stakeholders.

In order to have a clear and definite mission and goal that can be followed by all parties it is important to get all stakeholders involved, and to understand how Beit Misk took this factor into account, we started with the first question involving the mission and vision of Beit Misk and how clear it was translated to stakeholders.

1- Questions related to the 1st axis (Context, Mission ad Goals):

a. Is there a mission for Beit Misk and who participated in elaborating it?
b. Are there goals set for Beit Misk and who participated in elaborating it?
c. Is there a legal framework or Beit Misk and who participated in elaborating it?

Answers:

Is there a mission for Beit Misk and who participated in elaborating it?

As described by the participants, the mission is provided on Beit Misk's Website as well as Brochures created for Beit Misk, which include as quoted from the website,

> "Beit Misk promises a new way of life with everything within reach all year long. With our state-of-the-art Country Club, beautifully landscaped outdoor areas and Kids' playground, you and your family will benefit from a healthy lifestyle and peace of mind." (BeitMisk n.d.)

When asked what they received from Beit Misk, the participants conveyed their satisfaction with this project explaining that they got what they were promised, which is a better quality of life that is exactly what the mission statement of Beit Misk guarantees.

As residents living at Beit Misk, they expressed that they are aware of everything important in the community that they should know about and after they became part of the community, they understood the idea of the mission more clearly. Their opinion is considered in many ideas that are considered or modifications considered in the community, allowing them to feel involved in the revision of the mission and vision. It is a community effort and each person living there is involved in order to maintain this mission.

Are there goals set for Beit Misk and who participated in elaborating it?

The city/community's initiator, Mr. George Zard Abou Jaoude, envisioned the goals and values of this city, and it was this vision that had been the reason behind moving to Beit Misk. As expressed by Mr. Abou Jaoude, "BeitMisk is the perfect blend of everything magical about Lebanese villages, with all the conveniences of the world's leading cities."

Is there a legal framework or Beit Misk and who participated in elaborating it?

A legal framework is available and every resident has a full document explaining the legality of Beit Misk in addition to the legality of the purchased home including the duties and responsibilities of all concerned parties.

The second dimension that requires attention includes the daily decisions and operations of the Beit Misk that focuses on the plan followed by the decision makers and the process followed to achieve them and the process to evaluate the community achievement and how the officials are working to achieve its goals. This part includes the stakeholders involved in the management process and decision-making process and the evaluation of all related management processes, therefore understanding what the stakeholders are involved in it vital.

2- Questions related to the 2nd axis (Management orientation):

a. Is there a strategic plan at Beit Misk and who participated in elaborating it?
b. Is there a process for selecting decision makers at Beit Misk?
c. Is there a performance appraisal process at Beit Misk and who manages it?

Answers:

Is there a strategic plan at Beit Misk and who participated in elaborating it?

There is a strategy at Beit Misk and they are all aware of its milestones. They don't have a documented strategy and they didn't participate in elaborating it but they can, at any moment, suggest strategic actions to decision makers who in turn have the power to accept and add the suggested action or to reject it.

Regular meetings are conducted with the residents to get their feedback and to assess their satisfaction. During such meetings, the residents are informed of their rights and responsibilities and they are also informed about legal and regulatory requirements of the Lebanese government (legal and regulatory requirements that might affect the city/community).

Is there a process for selecting decision makers at Beit Misk?

The participants understand that there is an existing management and that the individuals running Beit Misk are providing the right decisions needed as they initiated the project. They appreciate that the management team is the existing one and there is no need to have any sort of elections for the time being, as they consider that the community needs more time and become more educated about its surroundings to start having elections to choose elected management.

They believe that for the time being and taking into consideration all internal and external positive and negative factors, they will not be able to accomplish what it is accomplished so far. Being involved more for the time being will affect them and the city/community negatively.

Is there a performance appraisal process at Beit Misk and who manages it?

In relation to evaluation and assessment of the project, all activities at Beit Misk are assessed on regular basis including the conducting performance appraisal of all Beit Misk's stakeholders. The Residents provide their own feedback and comments through questionnaires and surveys.

As for the stakeholder always being informed, there are regular newsletters posted and diffused to all stakeholders. These newsletters keep the stakeholders informed and updated about the actual activities and the milestones pertaining to the strategic plan of Beit Misk

The aim for the future is based on the strategy of the initiator, which is to transform Beit Misk into a Smart City with an effective governance system where the citizens voice is not only heard but also, he/she will be involved in all decision making.

In addition, another future plan includes working on the legal structure of the city/community and modifying it to include elections and more active involvement of stakeholders.

The third dimension we need to consider is Autonomy and how independent Beit Misk is and does it follow its own rules and regulations and is external interference non-existent or very limited, are key points that need to be clarified. We should also understand how financially autonomous Beit Misk is, or it is in need for continuous funding from stakeholders, or is affected by loans or investment projects and such factors.

3- Questions related to the 3rd axis (Autonomy):

a. What about the quality of life at Beit Misk?
b. How are human resources issues managed at Beit Misk?
c. Who manages the financial process at Beit Misk and how?

Answers

What about the quality of life at Beit Misk?

The residents consider that living in Beit Misk is priceless. The equality of life there is different in a positive way from any other city/community in Lebanon. Even though moving from where they previously lived and are used to; to a new place with a new concept that is not very familiar to many, was not an easy decision to make, but all interviewees believe that they made the right choice. The quality of life provided at Beit Misk is easy and comfortable and provides all the required amenities any individual or family would require.

How are Human Resources process managed at Beit Misk?

The management team responsible for the Human Resources system is directly related to the administrative and technical staff, working at Beit Misk. The decision to hire is based from a human resources management system that follows several steps,

including proper recruitment steps, orientation, induction, continuous training and conducting performance appraisal for the hired staff.

Who manages the financial process at Beit Misk and how?

Beit Misk is a city/community functioning on the financial returns especially from residents. So far external agents do all financial aspects, the residents are not directly involved, but they do understand and greatly appreciate that Mr. Georges Zard Abou Jaoudeh pays from his own money into Beit Misk without being funded by outside agencies. Residents are not aware of the financial procedures like establishing endowments.

In the future, residents are to become more involved in the financial processes of Beit Misk (Budget preparation, budget validation, assets management…)

Accountability is another factor that needs to be considered. This dimension refers to the accountability of the decision-making body and what they have achieved from the goals set by the project and the social responsibilities that they take into consideration. It includes the evaluation process and how the performance of the stakeholders are assessed and evaluated.

4- Questions related to the 4th axis (Accountability):

a. Is there a quality management system implemented at Beit Misk?
b. Are there social responsibility initiatives at Beit Misk?
c. What do you think of the financial integrity at Beit Misk?

Answers

Is there a quality management system implemented at Beit Misk?

There is a quality management system at Beit Misk, even without knowing exactly how to define a quality management system, (QMS) but they can feel the availability

of the quality culture at Beit Misk. the community is broken down into specific areas, each responsible for certain activities, works, aims and as soon as residents buy a property, they are handed manuals and guidelines with relevant policies and procedures. The residents are informed of all aspects of the community, what they aim, work on, want to achieve and what will affect their stay at Beit Misk.

Certain external recognitions are found at Beit Misk, related to quality management such as BREEAM certification, which is highly known, the company that owns the land and Highland, is ISO certified.

Is there a social responsibility initiative at Beit Misk?

Several social responsibility initiatives are done in Beit Misk. the community provides awareness to residents, working on waste management, composting, and many other areas that highlight social responsibility. Including but not limited to Waste management, with all the problems facing the Lebanese community in terms of waste management, Beit Misk managed to handle all the waste of the city/community. Waste is segregated (awareness to the residents), transported and treated, as needed, even Sukleen worked on helping the community with its waste. Composting is another area that Beit Misk worked on to help avoid waste and Green areas are continuously being monitored.

Several events and activities are created and conducted, for children, adolescents and adults throughout the year, bringing the community together and getting everyone involved, to be able to continuously communicate with each other.

Other social responsibility acts conducted include donations, Beit Misk collects Old clothes, shoes and toys to be distributed to families in need, this will help others and at the same time reduce a non-negligible amount of waste.

What do you think of the financial integrity at Beit Misk?

There seems to be a high level of Financial integrity, as it is evident by the regular reporting to residents on the financial status of the city/community. Everyone is informed of the community's financial standing and updates are always provided.

To have a yearly social responsibility report including the external and internal audit reports.

The last dimension to be considered is Participation, which can help us understand what the role of the existing stakeholders is in the community and in the decision-making process. Participation includes the level of involvement of stakeholders and how much their representation is important in the decision-making process, the services provided, and what their needs are.

5- Questions related to the 5th axis (Participation):

a. Representation and impact on decision making process

They believe that at this point it is enough to voice their ideas and consider the decisions of the existing management because so far, the residents are represented properly and their voices are heard, and at the present time there is no need for syndicates. They consider that participation should stay as is for the time being because they consider that Beit Misk is still too young to have a higher level of participation as disturbed by the Smart City/Community Governance Screening Card.

Below are the findings of the interviews with the Technical and Administrative Staff.

Focus group 2 (Technical and Administrative Staff)

The session was conducted in around 50 minutes and as with the 1st Focus group, the participants were requested to provide their contact information, and a general explanation about the thesis was provided and the mission behind the thesis was explained to them.

1. Questions related to the 1st axis (Context, Mission ad Goals):
    a. Is there a mission for Beit Misk and who participated in elaborating it?
    b. Are there goals set for Beit Misk and who participated in elaborating it?
    c. Is there a legal framework or Beit Misk and who participated in elaborating it?

Answers:

Is there a mission for Beit Misk and who participated in elaborating it?

The Staff are informed about the mission and vision of Beit Misk, as created by the community's initiator Mr. Abou Jaoude, and encouraged to follow the same path as staff of the community.

Are there goals set for Beit Misk and who participated in elaborating it?

To the Technical and Administrative staff. Providing the best service expected from them is what the community requires from them to achieve the mentioned mission and follow the community's vision.

Is there a legal framework or Beit Misk and who participated in elaborating it?

Similar to the Residents, the Staff is informed of their work at Beit Misk and their duties and responsibilities of all concerned parties. The legal framework of Beit Misk available is a part of the Lebanese territories and under the flag of the Lebanese Republic.

As technical and administrative working at Beit Misk, they should be involved in the revision of the mission and vision.

2. Questions related to the 2nd axis (Management orientation):
    a. Is there a strategic plan at Beit Misk and who participated in elaborating it?
    b. Is there a process for selecting decision makers at Beit Misk?
    c. Is there a performance appraisal process at Beit Misk and who manages it?

Answers:

Is there a strategic plan at Beit Misk and who participated in elaborating it?

They know that Beit Misk has a vision with specific goals and objectives. They don't know if the strategy is documented but they are sure that it follows an efficient path. Same as the resident, they didn't participate in the development of this strategic plan but they are playing a major role in monitoring this plan and also in amending the plan if needed.

Is there a process for selecting decision makers at Beit Misk?

As technical and administrative staff, they are the human potentials working to make Beit Misk's dream a reality. In order to achieve this, they understand that they should, and they do, follow accurate policies and procedures, they attend regular meetings where they can share their findings, experiences and know how.

Is there a performance appraisal process at Beit Misk and who manages it?

As technical and administrative processes, the selection of decision makers and process owners follows a recruitment procedure including job analysis, interviewing, orientation and integration, and the evaluation of recruits and the implementation of a regular performance appraisal process.

All activities and tasks at Beit Misk are monitored and evaluated on regular basis, in addition to the internal and external quality audit performed to make sure all processes are functioning effectively and as planned.

Consider having an election process in the future.

3. Questions related to the 3rd axis (Autonomy):
    a. What about the quality of life at Beit Misk?
    b. How are Human Resources process managed at Beit Misk?
    c. Who manages the financial process at Beit Misk and how?

Answers:

What about the quality of life at Beit Misk?

As part of their job descriptions, the Technical and administrative staff's main objective is to make life at Beit Misk a better life, which is what they are hired to do. They consider that the quality of life at Beit Misk is exceptional and they feel that they are one big family. They consider that coming to work is like working from home.

How are Human Resources process managed at Beit Misk?

As for the Human Resources process, at Beit Misk, the technical and administrative staff follow a human resources management process, made of an organizational structure is developed and operational. Each position in the organizational chart has its own job description with a clear reporting structure.

Recruitment of technical and administrative staff members is done according to need. Annual and individual training plans with relevant competency testing are available for each and every job. Performance appraisal process is available and operational.

Technical and administrative staff know that all financial activities are controlled in the most effective ways, from payroll to purchasing to budgeting. Depending on the

role of the technical and administrative staff, they are involved in some of the financial aspects of Beit Misk.

4. Questions related to the 4th axis (Accountability):
    a. Is there a quality management system implemented at Beit Misk?
    b. Are there social responsibility initiatives at Beit Misk?
    c. What do you think of the financial integrity at Beit Misk?

Answers:

Quality Assurance and quality control are key processes at Beit Misk. A quality manual is available. In the quality manual, processes are found, policies and procedures with relevant templates and instructions are available

At Beit Misk, they have several external recognitions related to quality management; they have a BREEAM certification, Highland, the company who own the land is ISO certified

Technical and administrative staff are involved in all social responsibility activities held at Beit Misk. They play an active role in the sustainable development of the green surfaces, they manages water treatment systems, they use waste water for irrigation (after filtering and special treatment), they even treat a part of the waste water coming from surrounding neighborhood in order to keep the city/community's environment clean and safe, they participate in all social events, they are key actors in the introduction of the quality culture at Beit Misk.

Technical and administrative staff are loyal to this city/community, they always refer to Bit Misk as "in our city" as if it was their home.

5. Questions related to the 5th axis (Participation):

    a. Representation and impact on decision making process

The technical and administrative staff are represented through their reporting line and their voices are heard. There are no syndicates, and communication and voicing of ideas and suggestions is encouraged by Beit Misk. the Staff feel as they are part of the community and work on providing their feedback where they see necessity for it.

They consider that the type of decision making and the level of their participation existing at Beit Misk, is very efficient.

Below are the findings of the interviews with the Suppliers, Contractors and Subcontractors.

Focus group 3 (Suppliers, consultants, subcontractors):

The session was conducted in around 45 minutes and as with the 1st and 2nd Focus groups, the participants were requested to provide their contact information, and a general explanation about the thesis was provided and the mission behind the thesis was explained to them.

1- Questions related to the 1st axis (Context, Mission ad Goals):

b. Is there a mission for Beit Misk and who participated in elaborating it?
c. Are there goals set for Beit Misk and who participated in elaborating it?
d. Is there a legal framework or Beit Misk and who participated in elaborating it?

Answers:

Is there a mission for Beit Misk and who participated in elaborating it?

Suppliers, consultants and subcontractors know that the mission and vision of Beit Misk are available on the website and on the newsletter distributed regularly. The mission and vision are not only documented information but also, they are the platform of Beit Misk, which is explained to everyone working at Beit Misk, working with Beit Misk and residing at Beit Misk.

Are there goals set for Beit Misk and who participated in elaborating it?

To the suppliers, consultants and subcontractors the goals of Beit Misk are connected to the vision provided by Mr. George Zard Abou Jaoudeh and they believe that Mr. Jaoudeh has succeeded in the ability to fulfill his dream. The goals of Beit Misk are set from the start, even before their involvement and as suppliers, consultants and subcontractors, they are bounded by these goals and by their deliverables.

Is there a legal framework or Beit Misk and who participated in elaborating it?

As for the legal framework of Beit Misk, they are not directly involved, but they know that this city/community abides by al the Lebanese legal and regulatory requirements.

2- Questions related to the 2nd axis (Management orientation):

a. Is there a strategic plan at Beit Misk and who participated in elaborating it?
b. Is there a process for selecting decision makers at Beit Misk?
c. Is there a performance appraisal process at Beit Misk and who manages it?

Answers:

Is there a strategic plan at Beit Misk and who participated in elaborating it?

There is a strategic plan at Beit Misk, as suppliers, consultants and subcontractors they are not involved in the initial development of this plan, but they are directly involved in the strategic actions pertaining to their role at Beit Misk. One example pertains to Beit Misk's landscaping, the landscape architect follows the strategic plan and delivers as planned. Once an amendment of his part in the plan is done, he will be notified and he has the right to give his opinion about the amendment.

Is there a process for selecting decision makers at Beit Misk?

As far as the selection of decision makers, they as suppliers, consultants and subcontractors are not involved and they don't have any input on such matters.

Is there a performance appraisal process at Beit Misk and who manages it?

As for the performance appraisals process, their work is assessed by the technical and administrative staff, in addition to the residents who have a satisfaction and complaints process regarding any supplier, consultant and or sub subcontractors.

3- Questions related to the 3rd axis (Autonomy):

a. What about the quality of life at Beit Misk?
b. How are Human Resources processes managed at Beit Misk?

c. Who manages the financial process at Beit Misk and how?

Answers:

What about the quality of life at Beit Misk?

The suppliers, consultants and subcontractors know that the work performed at Beit Misk is to improve the quality of life. They understand that the level of products and services provided should be of high quality and as per international standards when applicable. The projects they are working on and the services they are providing are controlled by the technical and administrative staff therefore they understand that the quality of work they need to provide should be at its best.

How are Human Resources processes managed at Beit Misk?

As suppliers, consultants and subcontractors, they are not involved and are not familiar with the processes the human resources functions at Beit Misk, but what they know is that people working at Beit Misk are selected among the best in the market.

Who manages the financial process at Beit Misk and how?

Suppliers, consultants and subcontractors know that financial processes are managed by the administrative staff and that their interaction with such a process is mainly through the purchase and accounting where they have to collect their fees.

4- Questions related to the 4th axis (Accountability):

a. Is there a quality management system implemented at Beit Misk?
b. Are there social responsibility initiatives at Beit Misk?
c. What do you think of the financial integrity at Beit Misk?

Answer:

Is there a quality management system implemented at Beit Misk?

Suppliers, consultants and subcontractors know that there is a quality management system at Beit Misk. They talk about quality assurance and quality control.

They know that at Beit Misk, they have several international recognitions in terms of quality management systems (ISO), BREEAM certification, and several articles in magazines talking about the importance of Beit Misk and its level of life provided to residents.

Are there social responsibility initiatives at Beit Misk?

Suppliers, consultants and subcontractors are involved in all social responsibility activities held at Beit Misk. They are considered stakeholders with relatively non-negligible impact on the social responsibility initiatives of Beit Misk.

What do you think of the financial integrity at Beit Misk?

Suppliers, consultants and subcontractors believe that this community has very high financial integrity and that is one of the reasons why they continue working there. everything is done in a professional and legal way with clear steps that are followed by all parties.

5- Questions related to the 5th axis (Participation):

a. Representation and impact on decision making process

There is no representation of suppliers, consultants and subcontractors in elaborating the strategy, in budget allocation, in the process management of Beit Misk

6. Case Study review

After learning more about Beit Misk, we can find great potential in this City but we need to also take into account the external factors that affect the city and its location. As clear and transparent as Beit Misk is aiming to be, it is still in an area that is not economically or politically stable. The Smart City elements mentioned in chapter 3 provide an insight into what areas smart project, methods and initiative can be applied. The community observed and tested shows great potential and applying these smart city elements allows the reader to see the different areas that show the level of smartness that exists. When we talk about technology, we have to consider that we live in a region that is not as advanced as many western or European countries, but still, Lebanon has proved to follow on the path of technology at its own pace and is exceeding in that area as the country has recently created a new governmental department and elected a member of parliament specifically for Technology. In this regards, Beit Misk has worked hard on applying the top smart technological advances available and with the collaboration of the government, it was the first area to apply fiber optic technology, as well as applying ICTs throughout the project, with sensors for the water treatment and waste treatment outlets, sensors and solar panels. One of the main targets is making everything computerized and they are working for this target to be achieved.

If we want to talk about infrastructure, we should understand that with the history of Lebanon and the wars it faced, we find many old and unstable infrastructure, with many areas being under review and attempts have been made to improve it, we still find that the infrastructure, the water management and the sewage systems are not advanced and are also unstable, while on the other hand we see that Beit Misk took it into their responsibility to handle the situation within the community by themselves the infrastructure is very advanced, can handle all climates, allowing it to be sustainable to last for a long time. The project created building that provides the same stable and sustainable form and if any

residents want to build their own accommodations, they have to abide by certain rules that are consistent with the community's infrastructure and regulations. The water and sewage systems have also been considered with water being filter continuously, using neighboring villages' water and providing the community with clean and fresh recurrent water.
The country's natural resources is endless whether its land, water, sun availability or any other assets available but Lebanon has not been able to take proper advantage of these assets. On the other hand, Beit Misk take advantage of the water trying to make it clean and accessible, the sun, creating solar system that can collect energy and use, they also make sure to protect and look after the surrounding natural habitat and trees and vast green land that surrounds the community.

When we talk about the economy, it is understood that Lebanon is not at a very stable time, even though the currency is good but the economy as a whole is shaky and facing an unsteady phase. With the introduction of Beit Misk, we find that one of their aims to provide more work, job opportunities, and business collaborations and labor opportunities.

The policy context situation in the country is not very easy, the legal regulatory and judicial system take a long time to process policies and implement them but in Beit Misk, as there is only one governing body we find that policy context is more simplified and the whole community is happy with that as decisions do not take long to be reviewed and decided upon. The only issue concerning Beit Misk is when the community needs to work with the Lebanese government on certain laws of regulations that would take time to be reviewed and approved. This is also related to the governance situation in both the country and Beit Misk. The same applies to but at Beit Misk we find that the deciding body has worked on creating written processes that are applied throughout the community and it is recommended that they create a Total Quality Management system to follow.

Lastly, we talk about community and this includes understanding that the Lebanese community as a whole is a welcoming and friendly country that shows positive vibes and is a good place to see and we see that in Beit Misk. The project provides a good vibe too with the

community coming together, celebrating holidays and creating events welcoming everyone from outside the community and encouraging collaborations and community engagement.

7. Data interpretation

Beit Misk is similar to any other city in the way it uses the services provided by the government and the relevant municipalities, this community abides by all legal and regulatory requirements of the Lebanese government. What makes it unique and gives it an added value, is that, in a country like Lebanon, which suffered from civil war for almost two decades and with a critical economic status; Beit Misk works in a different way, assuming part of the responsibilities of the government.

For instance, waste water is treated in Beit Misk by a treatment plant installed and managed solely by Beit Misk, the garbage is collected and treated internally within the community (waste is segregated and treated), as well as the general maintenance of the common and public areas which is also provided internally. Moreover, a private security company, within the community, assures security throughout the city and many other more amenities are provided.

In addition, in Beit Misk, there are no hospitals, no universities and no schools, and there is a valid reason for that. Lebanon is well known for the best quality of health care services and educational services in the Middle East and there are sufficient health care service providers and educational service providers in the surroundings of Beit Misk. As a result, the decision makers of the city concluded that it is best to use the surrounding services available, which is by itself is a smart decision.

Following the use of the tool to assess the governance of Beit Misk, the researcher found that the way things are managed at all levels is functioning efficiently and all stakeholders are

happy. The idea of having this one person who had the vision of creating Beit Misk and who is until today giving more and more in order to make the life of the citizens easy is appreciated by these citizens and by other stakeholders.

The future of Beit Misk, according to its strategic vision will definitely change at different levels:

- There will be a division of areas with an elected committee for each area
- There will be an election for the president and the members of this committee
- There will be general assemblies to discuss the present and the future of each area
- There will be general assemblies to keep all areas in line with the strategic vision of Beit Misk

The researcher believes that the shift in the governance of Beit Misk to increase the participation of stakeholders has its pitfalls.

The following section will provide a view of the results collected in regards to each dimension considered, as a benchmark in the University Governance Screening Score. These dimensions are the main factors that allow the tester to evaluate the main areas needed to view the success of smart projects or cities and understand what areas need further work on. Taking into consideration the 5 axis of the smart city community governance screening card, the following proposes the potential changes. The Appendix provided at the end of the thesis provides the results from the evaluation mentioned below and allows the reader to consider how the process works

AXIS 1: CONTEXT, MISSION AND GOALS

As shown on Appendix B, on Table 1: AXIS 1, Mission of the smart city / community, the four groups of stakeholders consider that a mission is available at Beit Misk and that this mission is stated in the bylaws of Beit Misk in addition to its availability throughout the community.

National and international experts, in addition to the senior technical and administrative staff, were involved in the construction of Beit Misk's mission, as they were there when the project first came into place and the idea was created with many of them involved. But as for the citizens, they were not involved with the construction of the mission, because it was decided upon at the start of the project and no existing residents were yet residing there.

As shown on Appendix B, on Table 2: AXIS 1, Goals of the smart city / community, in regards to the goals of Beit Misk, all four groups of stakeholders agree that there are existing goals and objectives applied and they all agree on the united effort to achieve them. As the missions were constructed from the beginning, so were the goals of Beit Misk. The goals set by the initiator of the project was designed from the beginning and all stakeholders understand and accept them and aim to abide by them as they provide what they want and require in as a community.

The success of the goals is monitored by the private owners as they follow on with what they have achieved and try to work on what they have not been very successful with. As a vision created by Mr. Abou Jaoude, achieving the vision is a goal by itself and maintaining this vision is vital for Mr. Abou Jaoude.

As shown on Appendix B, on Table 3: AXIS 1, Legal Framework, in this area the framework created for Beit Misk is similar to the goals and vision. It has been created to achieve what the founder was envisioning and for that, not much change has been required. As a

community that has not found any flaw it its development for the past 10 year, there is no need for it to change, but the plan of this project is to expand and grow and continue improving itself to continue being the best smart city in the region, providing its residents with the best quality of living available.

AXIS 2: MANAGEMENT ORIENTATION

As shown on Appendix C, on Table 4: AXIS 2, Strategy, the strategy created at Beit Misk is reported by on internal reports and internal memos provided to all stakeholders providing a clear understanding of the progress the community has achieved.

When the strategies were established they provided all the information any project or community needs to have, what its vision is, what values it promotes, and the path it is taking to achieve its goals with a detailed plan of action that is clear for everyone and including an internal regulation system with detailed procedures.

In order to measure the success of the goals created in the strategic plan of the project, several measures were adopted including Quantitative surveys producing performance data. Other measures include the reception of assessment reports by the decision-making body of the overall progress of the community. Other measure also includes assessment reports conducted by the government using an independent agency to see how the community is doing and how the laws and regulations are followed in accordance with the government's laws and regulations.

Other focuses included the area of involvement that the decision-making body was purely involved in, which include all the internal decision of the community, such as the long-term strategy of the project and the community's partnerships and investment decisions as well as the technical issues that have been implemented. The decision-making body

was also involved with the Human resources hiring and training process as well as the financial process and mainly the directives budget issues.

The decision-making process is mainly controlled be the chairman of the project, for the time being, but there is a future vision that the community will have its own elections but that will be applied once the residents are able as a community to make their own decisions. Until then appointments are done by a selection Committee.

As shown on Appendix C, on Table 5: AXIS 2, Selection of Decision Makers, this process includes all the community whether that means the senior staff, the residents, the private owners or donors and the community's official, but that does not involve the state as Beik Misk has its own internal independence and can make its own decisions. Decision makers are selected depending on their academic background and their managerial profile, who can provide a strategic plan for the city that can be beneficial for the community as a whole.

When considering the evaluation of the staff, their performance is accountable for by the community officials and decision-making body but not to the government or the private owners. As shown on Appendix C, on Table 6: AXIS 2, Performance and Evaluation of the Staff, their actions are also viewed and evaluated by the technical and social council who review the works that the community receives and the services provided are at their best.

In order to continuously motivate the staff while enforcing the rules and regulations, periodic performance evaluations are conducted with performance reports and compensations as well as Screening Card are used to provide incentive to the staff. Staff has to also provide justifications for their expenditures when required.

AXIS 3: AUTONOMY

As Shown on Appendix D, on Table 7: AXIS 3, Human Resources Management, the smart city is free to conduct any work it wants within its area, this includes being independent to decide on the structures of the community as well as services and processes implemented. The city can decide about the application of new practices and since they are the ones involved, the community is the main factor in providing their assessment on the quality of life at Beit Misk without the interference from outside. The community can also have the autonomy to refuse applications if they are not sure about them and the number of citizens who can reside in Beit Misk.

In addition to the residents, the city has the autonomy to be involved in the staffing procedures, the recruitment process and the hiring of technicians as well as work with the training programs and promoting staff members. In connection to this the city can assess the staff's performance, and set the salaries for them as well as the hiring contracts.

In regards to the financial process at Beit Misk, revenue collected is provided from different sources. These sources are not dependent on the government or grants or loans from international organizations. They are provided by fees from citizens, funds from private owners and loans from the bank, which makes Beit Misk independent from outside interference. As the money provided is financed from within, the allocation of these funds can be used from year to year and can be included in a multi-year budget. The city can set the level of citizen fees and can even run a deficit since it is an independent entity by itself.

As Shown on Appendix D, on Table 8: AXIS 3, Financial, as a city, certain financial components have to be clearly defined which include any investment that might occur under its name which is used to obtain additional revenue, as well as using interests that

are gained from investments. Another issue that should be defined includes the contracted long-term loans that the city adopts.

When it comes to buildings, the land and financial assets as well as the equipment used, the city has complete control and is self-dependent to choose what they see is required for the community as a whole and apply it. The area they are not free to be involved in includes the shares of the stakeholder that are directly related to the community as well as the shares of the stakeholders that are not directly related to the community's functions.

As an idea, Beit Misk was created to be an independent city which can provide its own solutions, funding, training, and be autonomous in almost every aspect available while abiding by the laws of the government and providing a smart and innovative quality of life for its residents.

AXIS 4: ACCOUNTABILITY

The quality assurance process at Beit Misk is very appropriate for the community. As Shown on Appendix E, on Table 9: AXIS 4, Quality, Integrity & Transparency, when it comes to accountability, the city is accountable for its actions and decisions which are followed-up by committees, participatory teams and regularly meetings and reviews and there is a quality assurance system that also assesses the community, which is conducted outside the community and is under the control of the government. There is a basic form of review over the evaluation's results that is followed by Beit Misk that involved establishing an action plan and following up on its progress as well as how budget allocations are in terms of results, as well as the implementation of corrective measures when required.

As an independent entity it has the autonomy to determine its own licensing and assess its own outcomes and determine the kind of facilities it implements and uses. And when it comes to misconduct or abuse of privileges, the city has the autonomy to place standardized sanctions against factors such as unethical behavior of citizens, noncompliance with city standards, and unethical behavior of staff.

As shown on Appendix E, on Table 10: AXIS 4, Social Responsibility, in regards to social responsibility the city worked on informing its community of all its progress and what outcomes it has achieved in various issues. A tracking system is conducted every couple of years across all the processes of the community and all the services and applications provided.

As shown on Appendix E, on Table 11: AXIS 4, Financial Integrity, the Stakeholders are involved with the financial status of the city and everything is provided in a transparent way for all parties involved such as the government, the related ministries and related municipalities, as well as the technical and administrative staff and of course the residents and the contributors to the city. As a vital factor in Beit Misk, making sure that the financial status of the city is on track, financial audits are conducted. They are conducted by an external entity that provides the related reports of the financial situation internally, mainly to the decision-making body and related official and to the residents when required. And in the event of any abuse or embezzlement or unjustifiable spending or procurement practices then there is standardized sanction prepared to handle such situations.

AXIS 5: PARTICIPATION

As shown on Appendix F, on Table 12: Axis 5 Participation, all dimensions were summarized in relation to participation and how involved the stakeholders are in each

step. The questions asked involved the stakeholders' mode of representation, such as syndicates or unions or associations and if so whether it is formal and active? And it was apparent that the private donors and owners had their own mode of representation. Then in second question asked, it is concerned with the stakeholder's participation in the decision-making and the different factors where they are involved in providing their opinions in areas such as the community's goals and strategies, budget allocation and management process.

This dimension also questions the stakeholders' known relationship with anyone in the community, such as representatives on the boards and councils, which include the highest decision-making body, anyone on the community's council or its equivalent, or anyone from the research council. In addition, research included the stakeholders' participation mode within the community's councils and whether it is through appointment or by election.

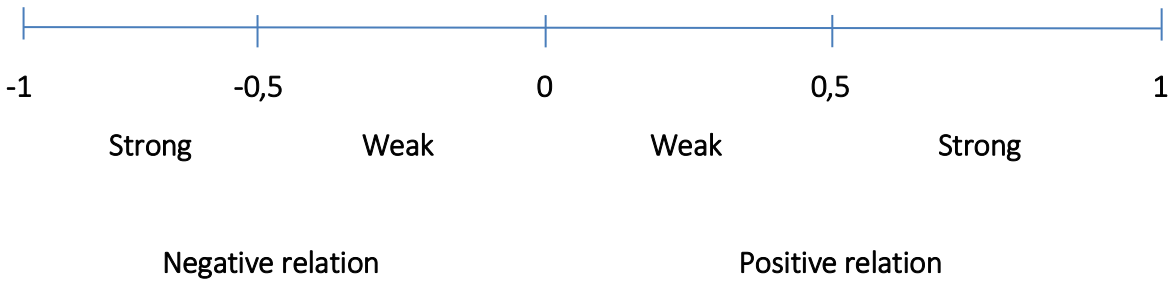
8. Data analysis

Accuracy and Validity

In order to assess the Accuracy of the data collected the researcher used SPSS (Statistical Package for the Social Sciences) for the analysis of correlations and regressions. The researcher wanted to make sure that the results are consistent between the four stakeholders and using the SPSS software is the best way to get that done.

Then there was the Pearson Correlation Coefficient, which was used to study the relation between the 2 variables, using the selected stakeholders (the Company Highland, the Residents, the Administrative & Technical staff and the Suppliers, Consultants and Subcontractors).

$-100\% \leq S \leq 100\%$ $(-1 \leq S \leq +1)$



The Significance Level was also analyzed as per the rule:

> "If **significance < p-value** so we can verify that this is a significant or true relation between two variables. "

In the following results, the letter "N" refers to the number of answered questions. The questions that were not answered, were considered non-applicable so they were not taken into consideration in the calculation and results mentioned below.

Axis 1: Consistent

N= 38 responses

The Pearson Correlation Coefficient S=+1 → Very Strong Positive Correlation; the two variables vary in the same sense, as one increases, the other one increases and vice versa.

At p=0.01, the level of significance is 0.01 → 99% confidence.

Axis 2: Consistent

N= 38 responses

The Pearson Correlation Coefficient S=+1 → Very Strong Positive Correlation; the two variables vary in the same sense, as one increases, the other one increases and vice versa.

At p=0.01, the level of significance is 0.01 → 99% confidence.

Axis 3: Consistent

N= 38 responses

The Pearson Correlation Coefficient S=+1 → Very Strong Positive Correlation; the two variables vary in the same sense, as one increases, the other one increases and vice versa.

At p=0.01, the level of significance is 0.01 → 99% confidence.

Axis 4: Consistent

N= 38 responses

The Pearson Correlation Coefficient S=+1 → Very Strong Positive Correlation; the two variables vary in the same sense, as one increases, the other one increases and vice versa.

At p=0.01, the level of significance is 0.01 → 99% confidence.

Scoring and Future Analysis

In the coming section the tables provided in the Appendix will be explained in more detail, providing a better understanding of the scores resulting from the interviews conducted with the residents, workers and officials at Beit Misk. Each table provides a list of questions asked to the focus groups and show the score of their responses.

Axis 1: Context, Mission and Goals

As Seen in Appendix G, on Table 13 and on Chart 1 provides a view of the scoring and Future analysis at the level of Axis 1, in future perspective, we should see a change in the number of participating stakeholders at Beit Misk as the elaboration of the mission and vision of the smart city community progresses. As per the above chart, the Mission is available and integrated through the smart city/community; in addition, it is stated on the website and in several articles.

It has to be stated clearly as documented information, meaning that like any other quality document, the mission has to be followed, monitored and revised regularity for any modification.

To review, not all stakeholders participated in the elaboration of the mission of Beit Misk, for several reasons including but not limited to the fact that the smart city/community was created from scratch, so the majority of the identified stakeholders were not present during the creative process of the project nor of the mission and vision statements.

In the present moment and with more individuals residing at Beit Misk, the considered stakeholders should be involved in the revision and the amendment of the mission when needed. Only close stakeholders like administration and technical staff in addition to the

owners are responsible for the monitoring of the mission. *In the future, they should consider other stakeholders like civil society, unions and government in the monitoring of the mission*

Just like the processes carried out for the mission of Beit Misk, the city/Community's Goals have also been set in advance and are followed closely. *In the future, they should consider involving more stakeholders in the setting and monitoring of the goals and objectives of the smart city/community.*

In regards to the Legal Framework of Beit Misk, that defines the smart city/community, it is similar and is applied in the same way as any other part of the Lebanese territory. There is no specific legal framework created or provided specifically for smart cities in Lebanon.

When we look at Management Orientation, as shown from the table below scores very high.

Axis 2: Management Orientation

As Seen in Appendix G, on Table 14 and on Chart 2 provides at the level of Axis 2, in future perspective, there might be a change in the mandate of the Governing Board allowing for different input from different bodies with different perspectives, but this can be applied after the city/community reaches a level of maturity allowing it to govern itself.

In terms of Management, the analysis of the data collected shows that management at Beit Misk's scoring was high, due to the fact that the smart city/community is a newly established community, where the decisions are still centralized. This factor was considered as positive and favorable among the stakeholders who were interviewed during the focus group discussions.

We then look at Autonomy, as shown in the next table, also scoring high results.

Axis 3: Autonomy

As Seen in Appendix G, on Table 15 and on Chart 3 provides at the level of Axis 3, in future perspective, there will be no changes; this is due to the fact that at the date of the assessment, the score received for the Autonomy was high.

Beit Misk scored high on Autonomy due to the fact that all funding and income are generated internally and that the government is not financially supporting such projects. The problem with the high score in Autonomy is that the saying *"qui donne ordonne"* might jeopardize the governance of the smart city/community in a way. When we consider the accountability score, we might be able to assess the transparency of the governance.

In the case of Beit Misk, they also scored high on Accountability, which means that the concentration of the decision-making is not affecting the governance in a negative way.

In the future, the government shall consider budget as incentive for smart cities.

Axis 4: Accountability

As Seen in Appendix G, on Table 16 and on Chart 4, Beit Misk also scored high on Accountability. Accountability is controlled by the implementation of a quality management system. All their processes are described in policies and procedures with sanctions and action plans controlling all aspects. Reporting structures is documented, operational and corrective measures are applied when necessary.

The data collected shows high scores on autonomy (Axis 3) and accountability (Axis 4) which sets equilibrium between the power provided through autonomy and the accountability factors allowing stakeholders to be sure that the autonomy provided is used responsibly.

As Seen in Appendix G, on Chart 5 and Table 17, we find that even though Beit Misk is not formally following a social responsibility standard, they are constantly applying socially responsible initiative and ideas including but not limited to:

- Governance
    - Beit Misk has a system by which they make and implement decisions in pursuit of objectives. This governance system enables them to take responsibility of the consequences of their decisions and actions.

- Human rights
    - Human rights are the basic rights to which all human beings are entitled; it includes such rights as the right to life and liberty, equality before the law and freedom of expression.

- Labor practices
    - At Beit Misk, they encompass all policies and practices relating to the work performed with, by or on behalf of the city, including subcontracted work.

- The environment
    - Decisions and activities of Beit Misk have an impact on the environment, these impacts may be associated with the use of resources, the location of the activities of the city, the general pollution and wastes and the impacts on the natural habitats. AT Beit Misk, they are adopting an integrated approach that takes into consideration the direct and indirect economic, social, health and environmental implications of their decisions and activities.

- Fair operating practices
    - Fair operating practices concern ethical conduct in dealings with other organizations. These include relationships with government agencies, as well

as partners, suppliers, contractors, customers, competitors, and the associations of which they are members. Beit Misk takes fair operating practices into consideration and this shows from the data collected especially from the suppliers and subcontractors focus group.

- Consumer issues
    - Beit Misk provides education and accurate information, using fair, transparent and helpful marketing information and contractual processes, promotes sustainable consumption and designs services that provide access to all and cater, where appropriate, for the vulnerable and disadvantaged.

- Community involvement and development.
    - Beit Misk considers that community involvement and community development are both integral parts of sustainable development.

Axis 5: Participation

Based on Appendix G, Table 18 regarding the Participation of stakeholders in the governance of the city/community, the researcher found that the private donors/owners are the only ones with formal mode of representation in the decision making at Beit Misk. But when taking into consideration other factors mainly the availability of a Quality Management system, the researcher can say that even the Technical and Administrative staff have a formal representation, in terms of a formal organizational structure, of the companies' managing Beit Misk.

Between the five categories of stakeholders, the private donors/owners are the ones who actively participate in the decision making for the definition of the Goals of Beit Misk, for the elaboration of the Strategy, the Budget Allocation and the Process Management. Citizens actively participate in the process management due to the fact that they can ask for the

modification of any policy/process/procedure and their requests are studied and implemented if they are found to add value and to improve the living at Beit Misk.

Technical and Administrative staff actively participate in the preparation of the budget in addition to the process management. The latter is mainly through the collection, analysis and interpretation of relevant key performance indicators. Private sector representatives including but not limited to leaders and industry chambers do not actively participate in decision making. So far, the private sector is considered a part of the outside world of Beit Misk because the private sector working in the city/community is considered among the suppliers/subcontractors.

The only stakeholders who have a representation in the highest decision-making body, the smart city/community council and the research council are the private donors/owners. Because citizens are owners, they have representation but not in a formal manner. The research council at Beit Misk is considered part of the strategic process of the smart city/community. *In the future they should consider having a formal and as per policies and procedures representation of the relevant stakeholders.* No election at Beit Misk so far, they consider themselves as too young to have elections. The mode of participation is appointment.

For the future, they should consider a formal election process.

The main potential changes could be at the level of Axis 5. The concerned stakeholders will be participating in decision making which could pose a huge problem if not managed effectively.

The idea of participation is that it should move smoothly to higher levels. Moving to higher level of participation might affect the output of the smart city process. On the short run, and with the increase in the number of decision makers, the output might be affected negatively.

What might be alarming is the length of the negative phase. The longer the negative phase is the greater the impact on the governance of the smart city.

Chapter Summary

To summarize the information provided from this study we can understand how a Smart community operates and what it needs to improve and progress. With the help of the tool applied we can conclude the needs and expected outcomes of the dimensions considered important in the governance of a Smart City.

This chapter discusses the case study applied to Beit Misk, a community that had been created with the aim of being the first Smart City in the region, located in Lebanon. The idea behind this case study is testing the University Governance Screening tool suggested in the previous chapter to view how Smart Cities can assess and evaluate their progress and initiatives in terms of governance.

After describing Beit Misk and how it is distributed and divided and what it has to offer its residents, the chapter explains the type of stakeholders involved and the research conducted. This included dividing the stakeholders into three focus groups and conducting interviews and observations and asking the major questions that are required from the University Governance Screening benchmarking tool to assess and evaluate the city's progress. Including the overall context, mission, and goals, as well as the management orientation of the city in the views of the stakeholders and the autonomy the city has and how accountable is the deciding body. And of course, the participation factor in Beit Misk and how much the stakeholders are involved.

The chapter then provides details of each group of interviews and interpretations of what the city provides and what it has to offer. Then it continues to explain the results provided in the Appendix for all the related question and dimensions, providing a data analysis including

using the SPSS even though the amount of residents isn't high but the process allowed for the study to provide a clear analysis. The chapter also provides the analysis using the Pearson Correlation Coefficient process. The chapter then explains the scores and the future analysis that the researcher expects should occur and should be taken into consideration at later stages.

In conclusion as it appears the Process followed by Beit Misk is very successful. The city has applied a great amount of data programs to collect the required information in order to understand and apply what the citizens need and provide the required services for the community.

Chapter 7: Conclusion

The Smart City concept was first introduced in the 1900s as a digital City, then became considered a Socially Inclusive City until recently, where it is now termed as “Smart City”. Cities in general need to take into account various factors that can affect their preservation, but the main target of any city is to maintain the best quality of life for its resident.

It is a continuous challenge for cities to achieve the goals they set for their community and an additional challenge to provide stability while maintaining their level of commitment to these goals. One of the main challenges that almost all cities around the world seem to face is the migration of populations from rural areas to urban areas and the increased overflow of people into their unprepared cities. With larger cities and populations, larger problems arise that need to be controlled or solved as not to lead to long-term problems. These surges of people have brought with them challenges that cities have and still are working on solving.

With the increase of settlers in cities, many that were not prepared for such a larger amount of settlers were faced with public service challenges affecting the supply of services provided by these governments, to the number of demands or the amount of people who required these services. Employment, which is one of the main reasons for people to migrate to urban areas, became difficult to achieve, with less job opportunities being available. This in turn had cause many people to stay unemployed, and end up living in the streets or becoming homeless, which had in addition caused an increased in the number of people living in slums. With the large number of settlers, the cities were not able to accommodate such huge amounts and as a result many cities were faced with housing problems. As a consequence, crimes rose, and proper law enforcement was not enough to handle many situations, causing instability, in addition to that the poor situation of residents allowed for increase in diseases and health problems and had an effect on the Educational system.

Other areas that were impacted include the infrastructures, the transport systems; the basic city services that should be available in all circumstance were also low. As a result, water

sanitations, sewage treatments and waste management factors were also affected and needed to be managed. Another area of interest that was influenced by this expansion was economic stability as globalization was increasing, markets were expanding across the continents, and many cities were trying to move towards the same path.

In an effort to improve their cities and find solutions for this urbanization, government officials started to improve and even introduce new governance structures and frameworks, sustainable solutions and technological advances. All through projects applied in areas that covered all aspects of city life, from public transport, to healthcare, to waste management control, to climate control, air quality, and knowledge transparency to citizens. Applying ICTs in areas that needed monitoring, sensors that can collect needed data, and any technological advances they can to monitor and stabilize key factors in their cities that can help them in improving their ability to provide better solutions, can control traffic congestion, water supplies, sewage treatments and even re-developed or build infrastructure as needed and worked on the economic status and market potential to be part of the globalization era. These improvements were applied separately by cities according to their needs and the problems they were faced with, not applied by all in the same way.

Governance could be explained in several forms, each focusing on the need at hand with different views of officials, managers, stakeholders involved and how to handle each situation in a more controlled way. Different types of governance include, behavioral governance, cognitive governance, financial governance, as they would impact decision making and their outcomes. There are also other types of governance such as collaborative governance, local governance, corporate governance and how they can improve the roles, responsibilities and communication of the decision-makers and leaders appointed. In addition, we find governance structures developed that focus on the environment, territorial factors and global implications.

When we talk about governance, we have to take into consideration the history of governance and the different elements created that can allow this concept to be

implemented in order to provide the best outcomes available. Therefore, when considering governance in cities we should consider several mechanisms that if applied properly will achieve the best results. We should start with participation, allowing citizens to be involved, to be informed and to be considered when plans and decisions are made. With that in mind, governments have to take responsibility of their actions and be accountable to the outcomes. To achieve this, having proper and legal framework that is clear and not corrupt is essential. In order to be clear and encourage participation, governments should be transparent and open to their people and responsive, which means that the suggestions, demands and needs of their residents should not just be considered, but implemented. Equity is another important issue, being fair with providing services to everyone and including all types of citizens and minorities with no exceptions and without differentiation allows governments to reach everyone with the best interest of everyone taken into account. With services provided to people, governments must make sure they are efficient, effective and useful for their communities.

Governance is the key factor in implementing better solutions for cities and with the world turning into a global village connected with technological advances, we find cities becoming smarter in an effort to fit in and provide the best to their residents. This Smart City concept, which has proved to be the essential way for cities to progress, is the best solution the world needs to adopt and when applied properly will have major positive impact on cities.

A large number of Smart City initiatives and projects have been developed and implemented throughout the world in major and small cities with great results that have improved cities and reduced the negative effects that years of carelessness, lack of the economy and communities' best interest were considered. We name several projects and smart initiatives developed and launched that have proven to show the importance of good governance. When applied properly, managed adequately and implemented in the right places, good smart governance has proved to be successful.

It is important to note that stakeholder participation is highly effective and is a major key factor in Smart Governance. Involving citizens in decision-making, getting their feedback and considering their needs, allows governments to provide their people with the quality of life they need and require. In order to maintain the positive outcomes of the strategies and initiatives these governments developed, it is important to understand the need to follow-up and continuously update and evaluate them.

We have proposed a tool that has had success in its implementation, in several aspects and which can be used by smart cities to assess and evaluate the projects they have adopted. This tool can be considered as a multi-purpose tool that can be utilized in many ways. It can be used to assess existing cities and their strategies; it can be used as an Action Plan for newly established cities, helping them to know where they should improve and work on, and it can be used by existing cities with new projects and initiatives to help them evaluate their successes and weaknesses.

As it is clear we did not go into detail of the technical aspect of smart cities governance as our focus on this thesis is mainly on the management part. Focusing on the managerial aspect of governance rather than on the technical aspects of the strategies used such as the ICTS, internet of things and other technological implementations adopted.

Our research was limited to the fact that we gathered information from journals and articles conducted by other people which were limited in knowledge on the managerial aspect of governance. The scarcity of resources has limited our research, but still as smart cities, conducting assessment and evaluations of the projects they implement, we need to understand that the issues affecting their progress or their success can be easily corrected, if they knew how to evaluate their strategies. Therefore, encouraging smart cities to consider this issue is not an easy task. People are not prepared for the idea of participation and involving stakeholders in the decision-making process is not a common practice. This is another issue that needs to be considered.

We took this tool from universities because we view universities as small communities but this might also be considered a limitation as the work, participation, accountability and responsiveness available in universities is not easily evident in cities at a larger scale. Another area we should mention is that we applied our experimentation of this tool on one community and one smart environment which might not be enough to expand on this idea.

As a positive note we can consider this tool a very useful mechanism that can have a great effect on smart cities if embraced. This tool can be used later on, in different way depending on what is needed. If someone wants to use this thesis to continue on something else, new projects, and new aspects or review existing processes, this can be achieved by working on specific key performance indicators (KPI) pertaining to this tool, relevant to a smart city that can be used to evaluate the performance of the city. These KPIs can be compared to the best in the field, meaning they can be benchmarked and even considered as a benchmark by itself, in the future.

The Smart City concept was first introduced in the 1990s as a “Digital City” then became explained as a “Socially inclusive City” until recently where is now termed as “Smart City”. It is generally focused on Six Factors; the environment, citizens, mobility, governance, economy and quality of life. The idea started with Cities using ICTs and applying user-friendly technologies to reach a sort of Utopian City.

It became more elaborate where it involved applying innovative governance approaches using both modern and traditional infrastructure and the natural resources available to create a better quality of life and promote environmental and economic sustainability with the collaboration of citizens. For years Smart city approaches have been created and implemented and it is concluded that each city adopts the approaches and initiatives suited to its environment, its needs, available resources and existing problems.

Therefore a smart city definition would be very broad, but it has been identified that eight elements can be used to create the structure of smart city initiatives: *Management,*

Technology, Governance, Policy Context, the Community, Economy, Infrastructure and *Natural Resources*, which provide guidelines and outlines for smart city research and practical implications for related professionals (Chourabi, H. & Walker, N.S et al, 2012).

Type of city Beit Misk

Beit Misk is considered the first "Smart City" in Lebanon, with 24-hour connection, and sensors distributed all over the community to provide data on all aspects of it. As a city that is encouraging green living, it is situated in an area surrounded by green life, forest and walking areas that promote an environmentally friendly atmosphere.

Even though many smart initiatives have been applied in Lebanon and smart projects are in effect, Beit Misk is a new concept located in a country that has various environmental issues, political issues and face insecurity and economic instability. As a model, it promotes hope for providing such opportunities to many other cities within Lebanon and eventually applying Smart innovations all throughout the country. The city provides a clear idea of clean environment, effective and safe water treatments, sanitary applications, electricity solutions, and a safe and secure environment for its citizens. We find that even the staff regardless of their job specification are involved in promoting a clear, stable and workable environment and do not ignore or overlook any irregularity that they spot. We also find that as residents, their involvement in the community is very important and their willingness to take part in our interviews and take the time to promote and discuss their city of residence shows how successful the process is in providing an area that people feel belongingness and involvement and pride in being a part of.

Governance at Beit Misk

The creation of Beit Misk was a vision and goal that Mr. Georges Zard Abou Jaoudeh was dreaming of developing in his country. it required an entrepreneurial vision, planning and

innovation in providing this vision under the circumstances of the country as a whole and knowing that there are people who would have the same vision and who would invest and join in achieving this idea was not evident. The governance process applied at Beit Misk is at its first stage now until the city is able to run itself and the citizens are more invested into what the city's aim is. This stage is managed by the decision-making body which includes the founder and the involved management team. When the community is better prepared an elections process will be applied with already planned and clearly stated steps of how and what the process will involve.

The initiative of Beit Misk is a community moving towards Smart city. The foundations that were created include smart mechanisms and technological systems but in order for this community to be considered independent and smart it needs to go through several more changes. When we want to consider on what level Beit Misk stands, we consider the applied theories and solutions mentioned throughout the thesis and how many have been applied on this community.

For instance, the smart solutions adopted, ICTs are provided in most aspects of the city, where there are sensors and data collection programs that are a major factor in Beit Misk, focusing on understanding what the community needs and maintaining a stable environment. Even the fire alarms and security systems were deployed with sensors and any other element that required digitalization. All these elements were then connected together using a wireless network connected by a base station from Cisco, that gathers the data collected from the sensors into ThinkPark, a platform, provided by another leader in its field, Actility. The monitoring of the sensors on the meters and systems were then conducted in the technical room of each building (Nader 2017). Beit Misk has worked on its air-quality providing its residents a Pollution-free environment with clean streets. The community's climate and weather are monitored as well as the green areas that exist throughout the city being surrounded with natural forest. The community has been developed with waste treatments to handle any type of waste produced by the community; it has sensors for all garbage stands, as well as water treatments created to filter water to be reused and not

wasted. Providing sensors that measure the quality of air particles and the levels of different gases in the air for citizens to be informed continuously on the air situation around them is another plus for the community (Nader 2017), which is how the city was able to be digitalized, as well as its infrastructure, its utility gauges such as the gas, water and electrical meters, sewage treatment systems, oil and water reservoirs, water pumps. The idea of the distributed sensors and smart application developed, allows the city's maintenance and facility team to observe the community. The monitoring of the sensors and their results aimed to provide data about every aspect of the city that was gathered and stored on the platform created by Data Consult, the Data Orchestration Platform, inputted into Google Cloud. This in turn provided facility managers with the analytical data they need to supervise the whole project, helping them concentrate on managing the resources of the city and improving the residents' use of them.

In addition, Beit Misk partnered with several companies to create what it has today and provide the services it is able to provide for its residents. With collaborators such as Ogero, Lebanon's national operator, who were responsible for implementing the Internet of Things (IoT) network throughout the community, as well as Data Consult who provided the innovative solutions in all areas of the city and using their data-based platform.

Beit Misk also works on social responsibility initiatives; they conduct events and charitable work. Residents are encouraged to donate clothes that are sent to people who are less fortunate; and events are conducted for holiday celebrations to bring the community and surrounding communities close together to encourage public and private sectors involvement. It usually creates recreational and family events and festivals such as Santa's Factory festival, lunch events for the summer (Beiruting 2014) (Dent 2018), summer camps in collaboration with kids' centers, as well as events such as concerts and even film festivals (Libelium 2017).

In regards to the relationship between the deciding body and the residents of this community we find that there is an on-going communication process that exists and a transparent

relationship in many aspects of the community. Residents are able to comment, complain or provide their opinions directly to the city's managing team and in return we find that the deciding body is very responsive, whether it's a complaint, or a request or any other issue, it is corrected, or taken into consideration with the use of Smart City application relating to Beit Misk which was created for that reason. To communicate with the residence on everything they need to know, allowing participation and communication to take place, allowing them to be aware of their effect on the community. To make sure that the data collected is safe the secured software and dashboard are used are protected by an authentication mechanism using Google Single Sign-On (SSO), with everyone having a secure login access (Actility 2017).

The areas that have not been shared with the resident include major decisions that are still under the deciding eye of the officials as the community is still not ready to be involved in the major decisions yet. And in regards to this issue, it is suggested by the researcher that when the time is right for Beit Misk to create elections and encourage the residents to vote and create a managing board, then is such a situation the results that were provided in the previous Chapter might be affected. In this case, and this is where the suggested ***Screening card*** can be used properly, with the help of the ***Screening card,*** the community can reassess what areas can be worked on, corrected and improved upon, in order to make the process successful by modifying the governance structure that exists.

Why Beit Misk

Beit Misk is a project that was a dream come true for a visionary who hoped that this project will help in providing a great impact on Lebanon. Mr. Abou Jaoudeh loves his country and can see the potential it has to grow and achieve the highest levels of technology, smartness and economic success it has experienced before. The location of Beit Misk combines all the beauty found in Lebanon at one spot, it is in an area that can overlook the sea, the mountains, the neighboring cities and still be surrounded by a vast natural habitat of tress and green lands. Being just a few minutes away from the country's downtown areas, it's snowy slopes and its beautiful beaches allows this area the easy access its resident would want.

Beit Misk is exactly what the country need in regards to achieving a modern smart living environment that can provide services to its resident and encourage partnerships and collaborations between the government organizations, private companies and startup entrepreneurs allowing for more job opportunities and a more conscious community to exist, thus encouraging the Lebanese country to see its own potential and follow in that path.

The uniqueness of Beit Misk is what makes it special and what attract people to it. In an unstable country like Lebanon, with advancements in technology and the willingness of the Lebanese people to advance, introducing this project could have a huge impact in more Smart Cities arising in the future and more smart initiatives being introduced in the region. We can already find many small advanced projects being applied which shows the readiness for change is there for example the introduction of solar panels in the village of Qabrikha, in order to reduce the problem of electricity power shortage that exist. (Di 2019) This project was introduced by the European Union and just like Beit Misk if it shows future success, it can impact the whole country. With the use of the Governance Screening Card the success of these projects will definitely be lasting ones.

Appendix

Appendix A

Governance of smart cities

Date: ___/____/_____

Time: ____:_____

Focus Group: _____ → → Animated by: Vincent El Mazraani

Purpose: PhD Thesis related to the evaluation of the governance of smart cities

Name	Telephone #	E-mail	Signature	

Images of the Contact list form.

Appendix B

Table 1: AXIS 1 - CONTEXT, MISSION AND GOALS

A. Mission of the smart city / community

		Highland	Admin /Tech	Residents	Suppliers/ Consultants
1.	Is the general mission of the smart city/ community institution stated?	1	1	1	1
2.	Where are they stated?				
	I- National Law	0	0	0	0
	II- Decree (or similar)	0	0	0	0
	III- Public reports and smart city / community documents (Mandatory)	0	0	0	0
	IV- Smart city/community bylaws (Mandatory)	1	1	1	1
3.	Which actors participated in the elaboration of the mission?				
	I- The National and/or Local Government (will give more power to the mission)	0	0	0	0
	II- Civil society representatives	0	0	0	0
	III- Industry & business representatives	0	0	0	0
	IV- Syndicates/unions	0	0	0	0
	V- Administrative and/or Technical Staff (High importance)	1	1	1	1
	VI- Citizens (High importance)	0	0	0	0
	VII- National and international experts	1	1	1	1

Defining the results : 0=No response, 1=one response, NA= Not applicable

Table 2: AXIS 1

B. Goals of the smart city/community

		Highland	Admin /Tech	Residents	Suppliers/ Consultants
4.	Are the specific goals of your smart city/ community stated? If the answer is (0) --> the remaining should be zeros. But nevertheless all questions should be answered	1	1	1	1
5.	Where are they stated?				
	I- National Law	0	0	0	0
	II- Decree (or similar)	0	0	0	0
	III- Public reports and smart city / community documents (Mandatory)	1	1	1	1
	IV- Smart city/community bylaws (Mandatory)	1	1	1	1
6.	Which actors are in charge for monitoring their achievement?				
	I- The State (Government, Parliament)	0	0	0	0
	II- Smart city/community leadership (Head or equivalent)	1	1	1	1
	III- Social council (e.g. civil society, industry & business representatives, associations, donors)	0	0	0	0
	IV- Senior Management Team	1	1	1	1
	V- Highest decision-making body (such as governing board, board of trustees or other)	1	1	1	1
	VI- Other smart city/community councils (e.g. Academic, Research,..)	0	0	0	0
	VII- Private owners (If applicable)	1	1	1	1
	VIII- The State (Government, Parliament)	0	0	0	0

Defining the results : 0=No response, 1=one response, NA= Not applicable

Table 3: AXIS 1

C. Legal Framework

		Highland	Admin /Tech	Residents	Suppliers/ Consultants
7.	Is there a National Legal framework that defines the Status of smart city / community?	1	1	1	1

8.	How many times has this National legal framework been modified in the last 10 years?				
	I- None	0	0	0	0
	II- One Time	0	0	0	0
	III- Two Times	0	0	0	0
	IV- Three Times	0	0	0	0
	V- More than Three Times	0	0	0	0

9.	What is the event that better explains the last changes in the National Legal Framework?				
	I- Reform of the law conducted by the National Assembly/Parliament (or similar)	NA	NA	NA	NA
	II- Replacement of the executive (president, minister)	NA	NA	NA	NA
	III- Effects of a financial/economic crisis	NA	NA	NA	NA
	IV- Alignment with international trends	NA	NA	NA	NA
	V- Other	NA	NA	NA	NA

Defining the results : 0=No response, 1=one response, NA= Not applicable

Additional Questions Axis 1 - Important: please give more precision, if relevant, about the following items:

I-	What are the mission statement and goals of your smart city/community?				
II-	If existent, what were the main changes in the national legal framework in the last 10 years? What were the main reasons?				
III-	Is there currently a smart city/community law waiting to be implemented? If so, why?				

Defining the results : 0=No response, 1=one response, NA= Not applicable

Appendix C

Table 4: AXIS 2: MANAGEMENT ORIENTATION

A. Strategy

		Highland	Admin /Tech	Residents	Suppliers/ Consultants
10.	If a strategy is established (at the smart city/community level), which means are used for its statement?	1	1	1	1
I-	Internal reports, road maps	1	1	1	1
II-	White paper, wide consultation [internal, external consultation boards of assessments, and external consultants]	0	0	0	0
III-	Partnership with the state	0	0	0	0
IV-	Other Keep this question and assess it at the end. If no other --> NA	0	0	0	0

11.	a.	Did the development of the Strategic Plan included detailed deliberations and analysis of the following?			
I-	Vision	1	1	1	1
II-	Values promoted	1	1	1	1
III-	Process for achievement of the goals	1	1	1	1
IV-	Detailed action plans	1	1	1	1
V-	Internal regulation and procedures	1	1	1	1
VI-	Other Keep this question and assess it at the end. If no other --> NA	1	1	1	1

b.	Does the current Strategic Plan include				
I-	Vision	1	1	1	1
II-	Values promoted	1	1	1	1
III-	Process for achievement of the goals	1	1	1	1
IV-	Detailed action plans	1	1	1	1
V-	Internal regulation and procedures	1	1	1	1
VI-	Other Keep this question and assess it at the end. If no other --> NA	1	1	1	1

12.	Are the following elements used to measure the attainment of the specific goals of the strategy?				
I-	Quantitative surveys producing performance data	1	1	1	1
II-	Assessment reports conducted by and or used by the highest decision-making body of the smart city/community (such as governing board or other)	1	1	1	1
III-	Assessment reports conducted by the State (Parliament or Government)	1	1	1	1
IV-	Assessment reports conducted by an independent agency	1	1	1	1
V-	Other Keep this question and assess it at the end. If no other --> NA				

13.	During the development of the strategic plan, in which of the following areas did the highest decision-making body of the smart city / community (such as governing board or other) make decisions.

I- Long-term strategy	1	1	1	1
II- Smart city/community relationships (e.g. partnerships)	1	1	1	1
III- Technical issues	1	1	1	1
IV- Human resources directives	1	1	1	1
V- Budget issues	1	1	1	1
VI- Other Keep this question and assess it at the end. If no other --> NA				

Defining the results : 0=No response, 1=one response, NA= Not applicable

Table 5: AXIS 2

B. Selection of Decision Makers

	Head (*) of the smart city/community	Highland	Admin /Tech	Residents	Suppliers/ Consultants
14.	What is the selection process of each actor?				
	I- Appointment by the Government (Might be a neg. point)	0	0	0	NA
	II- Appointment by a Selection Committee (****)	1	1	1	NA
	III- Elections (*****)	0 CHECK THE HARD COPY BC IT WAS 1	0	0	NA
	IV- Others Keep this question and assess it at the end. If no other --> NA	1	1	1	NA
15.	Who is implicated/involved in this process?				
	I- The State (Parliament, Ministries or Regional authorities)	0	0	0	NA
	II- Smart city/community leadership (highest decision-making body,...)	1	1	1	NA
	III- Senior staff	1	1?	1?	NA
	IV- Private owners or donors	1	1	1	NA
	V- Citizens	1	1?	1?	NA
	VI- Other Keep this question and assess it at the end. If no other --> NA	0	0	0	NA
16.	What are the requirements to be selected? You may select more than one criterion				

I-	S/he is an academic	1	1	1	1
II-	S/he needs to have a managerial profile	1	1	1	1
III-	S/he can be an external person from the smart city/community	1	1	1	1
IV-	S/he has to meet a full job specification	0	0	0	1
V-	S/he has to propose a strategic vision for the smart city/community	1	1	1	1
VI-	S/he is a member of a political party	0	0	0	1
VII-	Others Keep this question and assess it at the end. If no other --> NA				

17. What are the conditions of their mandate?

I-	The length is less than 4 years				
II-	It's not renewable	0			
III-	It's renewable but the number of mandates is limited				
IV-	There is no formal mandate	0			
V-	Other Keep this question and assess it at the end. If no other --> NA	IT IS RENEWABLE	IT IS RENEWABLE	IT IS RENEWABLE	IT IS RENEWABLE

Defining the results : 0=No response, 1=one response, NA= Not applicable

Table 6: AXIS 2

C. Performance and Evaluation of the Staff

		Highland	Admin /Tech	Residents	Suppliers/ Consultants
18.	Are the staff members directly accountable of their performance to the following actors?				
I-	The State (Parliament, Ministries or Regional authorities)	0	0	0	0
II-	Smart city/community leadership (highest decision-making body, Head)	1	1	1	1
III-	Smart city/community councils (Technical, Research or Social council)	1	1	1	1
IV-	Head of departments / process owners	0	0	0	0
V-	Quality Assurance unit (smart city / community effectiveness, smart city / community research and assessment, etc.)	0	0	0	0
19.	What kind of policies to provide incentives/ enforcing of rules are used to manage the staff of each department?				
I-	Periodic performance report	1	1	1	1
II-	Compensations, salaries attached to performance	1	1	1	1
III-	Providing justifications for expenditures	1	1	1	1
IV-	Scorecards	1	1	1	1
V-	Standardized sanctions in case of professional misconduct	0	0	0	0

Additional Questions Axis 2 - Important: please give more precision, if relevant, about the following items:

I-	Are the results of the strategic process mentioned in qu. 11b available? Where?				
II-	Are the reports mentioned in qu.12 available? Where?				
III-	When did the last [election / appointment / recruitment] of the head and the governing board take place?				
IV-	Are the majority of the members of the highest decision-making body of the smart city / community (Governing Board or equivalent): not affiliated with the smart city/community as employees or citizens, or are they affiliated with the smart city /community as employees or citizens?				

Defining the results : 0=No response, 1=one response, NA= Not applicable

Appendix D

Table 7: AXIS 3: AUTONOMY

		Highland	Admin /Tech	Residents	Suppliers/ Consultants
20.	Has the smart city/community the autonomy to decide the:				
I-	Structure of the smart city/community (e.g. type of services, processes)	1	1	1	1
II-	Introduction of new processes	1	1	1	1
III-	Assessment of quality of life(leaving outcomes),	1	1	1	1
IV-	Partnerships with other institutions	1	1	1	1
21.	Has the smart city/community autonomy to determine:				
I-	The overall number of citizens living in the smart city/community (e.g. is the smart city/community able to refuse applications)	1	1	1	NA
II-	The acceptance mechanisms	1	1	1	NA
III-	The citizens it admits/accepts	1	1	1	NA

A. Human Resources Management

22.	Regarding staffing procedures, has the smart city/community autonomy for:				
I-	Hiring new administrative staff on a permanent basis	1	1	1	NA
II-	Dismissing administrative staff	1	1	1	NA

III-	Hiring technical staff on a permanent basis	1	1	1	NA
IV-	Dismissing technical staff	1	1	1	NA
V-	Developing staff training programs	1	1	1	NA
VI-	Promoting staff members	1	1	1	NA

23. Has the smart city/community autonomy for :

I-	Assessing the performance of administrative and technical staff	1	1	1	NA
II-	Setting the salaries of technical staff	1	1	1	NA
III-	Setting the salaries of administrative staff	1	1	1	NA
IV-	Setting variable salaries (linked with performance and/or credentials)	1	1	1	NA
V-	Setting the Contracts of administrative and technical staff (e.g. duration, benefits)	1	1	1	NA

Defining the results : 0=No response, 1=one response, NA= Not applicable

Table 8: AXIS 3
B. Financial

24.	What are the different revenue sources of the smart city/community Please answer question 24 using percentages of the total budget				
I-	Funds from the State/Local Government (budget allocation, grants, other)	0	0	0	NA
II-	Fees from citizens	1	1	1	NA
III-	Funds from Private owners	1	1	1	NA
IV-	Funds raised from Private companies (e.g. industries, businesses)	0	0	0	NA
V-	Loans obtained from banks	1	1	1	NA
VI-	Loans and grants obtained from International organizations	0	0	0	NA
VII-	Funds from contracts (e.g. consulting, outsourcing)	0	0	0	NA
VIII-	Revenues obtained from research grants	0	0	0	NA

25.	a. Regarding the financial procedures, has the smart city/community autonomy to:				
I-	Use unspent funds from one year to another	1	1	1	NA
II-	Set the level of citizen fees	1	1	1	NA
III-	Run a deficit	1	1	1	NA
IV-	Use a multi-year budget	1	1	1	NA

V-	Allocate the funds inside a block-grant budget	0	0	0	NA

b. Does the smart city/community have to define the following components of its financial structure?					
I-	Establishing endowments	0	0	0	NA
II-	Investing money to obtain additional revenues	1	1	1	NA
III-	Using the interest gained from investments	1	1	1	NA
IV-	Establishing public-private partnerships	0	0	0	NA
V-	Issuing bonds	0	0	0	NA
VI-	Contracting long-term loans	1	1	1	NA

26.

Has the smart city/community autonomy for :					
I-	Buildings	1	1	1	NA
II-	Land	1	1	1	NA
III-	Financial assets	1	1	1	NA
IV-	Equipment (Motorized, IT) and furniture	1	1	1	NA
V-	Stakeholder shares directly related to the functions of the smart city/community	0	0	0	NA
VI-	Stakeholder shares indirectly related to the functions of the smart city/community	0	0	0	NA

Additional Questions Axis 3 - Important: please give more precision, if relevant, about the following items:

If existent, what kind of approval is needed in qu.20 to 23?				

Appendix E

Table 9: AXIS 4: ACCOUNTABILITY

A. Quality, Integrity & Transparency

		Highland	Admin /Tech	Residents	Suppliers/ Consultants
27.	If there is a Quality Assurance system at your smart city/community, which of the ones are applicable to you:				
	I- It takes place inside the smart city / community (e.g. committee, participatory team...)	1	1	1	1
	II- It takes place outside the smart city /community under the responsibility of the Government	1	1	1	1
	III- It takes place outside the smart city /community under the responsibility of an external quality assurance specialized agency nongovernmental	0	0	0	0
	IV- None of the above	0	0	0	0
28.	Has the smart city/community autonomy to determine:				
	I- Smart city/community licensing	1	1	1	1
	II- Accreditation of the smart city/community	0	0	0	0
	III- Assessing Process Outcomes	1	1	1	1
	IV- Research	0	0	0	0
	V- Facilities	1	1	1	1
29.	What are the mechanisms used to follow up on evaluations' results?				

I- Establishing of Action Plans	1	1	1	1
II- Variable budget allocations are linked with results	1	1	1	1
III- Implementing of corrective measures	1	1	1	1
IV- Others				

30.

a. Has the smart city/community put in place standardized sanctions against:				
I- Fraud	1	1	1	1
II- Unethical behavior of citizens	1	1	1	NA
III- Noncompliance with standards	1	1	1	1
IV- Unethical behavior of staff	1	1	1	1
V- Others				
b. Has the institution applied standardized sanctions against the following in the past year:				
I- Fraud	0	0	0	NA
II- Unethical behavior of citizens	1	1	1	NA
III- Noncompliance with standards	1	1	1	NA
IV- Unethical behavior of staff	1	1	1	NA
V- Others				

Defining the results : 0=No response, 1=one response, NA= Not applicable

Table 10: AXIS 4

B. Social Responsibility

		Highland	Admin /Tech	Residents	Suppliers/ Consultants
31.	If existent, what are the characteristics of the tracking surveys used by the smart city / community to track its process outputs and outcomes				
	I- Being conducted across all processes at the smart city/community	1	1	1	1
	II- Being conducted once every three years	1	1	1	1
	III- Being conducted after five years	1	1	1	1
	IV- Being used to inform the public.	1	1	1	1
32.	Are the following items disseminated by one (or more) of the means mentioned in qu.31?				
	I- Smart city/community mission & goals	0	0	0	0
	II- Strategic plan of the smart city/community	0	0	0	0
	III- Results of the smart city/community evaluations	0	0	0	0
	IV- Financial statements	0	0	0	0
	V- Minutes of the members of the highest decision-making body	0	0	0	0
	VI- Social responsibility and sustainability report	0	0	0	0

Defining the results : 0=No response, 1=one response, NA= Not applicable

Table 11: AXIS 4

Financial Integrity

33.	Are the financial documents available and/or reviewed by the following stakeholders:				
	I- State (Ministries responsible agency)	1	1	1	NA
	II- Senior Technical and administrative staff	1	1	1	NA
	III- Administrative and Technical staff	1	1	1	NA
	IV- Citizens	1	1	1	NA
	V- Media, public audience	0	0	0	NA
	VI- Donors	1	1	1	NA
34.	What are the characteristics of the smart city/community financial audit:				
	I- Is it conducted by an external body?	1	1	1	NA
	II- Is the report available for inside audience [leadership]?	1	1	1	NA
	III- Is the report available for general inside audience?	1	1	1	NA
	IV- Is the report disseminated outside the smart city/community or made public?	0	0	0	NA
5.	Does the smart city/community have in place and enforces standardized sanctions against:				
	I- Embezzlement	1	1	1	1

II-	Inappropriate spending (failure to present justifications)	1	1	1	1
III-	Inappropriate procurement practices	1	1	1	1

Additional Questions Axis 4 - Important: please give more precision, if relevant, about the following items:

Who leads the mechanisms used to follow up on evaluations' results of the QA system?				
Who leads the mechanisms used to follow up on evaluations' results of the QA system? And how frequently is this done?				
When was the last time that a smart city/community self-assessment was conducted?				
When was the last time that the smart city/community was accredited? By whom?				
When was the last time that the smart city/community was certified? By whom?				
When was the last time that one of the sanctions of qu.30 has been applied?				
If the smart city/community financial audit is available to inside audience, who are they? Please list.				

Defining the results : 0=No response, 1=one response, NA= Not applicable

Appendix F

Table 12: AXIS 5: PARTICIPATION

Stakeholders: Representation, Impact on Decision-Making Process

	36. Do the following stakeholders have a formal and active mode of representation ?	37. Do they actively participate in the decision-making for the following items:	38. Do they have representatives on the following boards/councils ?	39. If existent, what is the mode of participation within any of the smart city / community councils?
Please use the following Codes to answer	0 = No 1 = Yes (association, syndicate, union)	0 = No 1 = Yes	0 = No 1 = Yes , with consultative role	1 = Appointment 1 = Election
			1 = Yes, and they vote	Only one answer can be selected

A. Citizens	0	Definition of the goals of the smart city / community	0	Highest decision-making body	0	Participation by appointment	0
		Elaboration of the strategy	0	Smart community / city council or its equivalent	0	Participation by election	0
		Budget allocation	0	Research council	0		
		Process management	1				

B. Technical Staff	0	Definition of the goals of the smart city / community	0	Highest decision-making body	0	Participation by appointment	0

		Elaboration of the strategy	0	Smart community / city council or its equivalent	0	Participation by election	0
		Budget allocation	0	Research council	0		
		Process management	1				

C. Administrative Staff	0	Definition of the goals of the smart city / community	0	Highest decision-making body	0	Participation by appointment	0
		Elaboration of the strategy	0	Smart community / city council or its equivalent	0	Participation by election	0
		Budget allocation	0	Research council	0		
		Process management	1				

D. Private Donors / Owners	1	Definition of the goals of the smart city / community	1	Highest decision-making body	1	Participation by appointment	1
		Elaboration of the strategy	1	Smart community / city council or its equivalent	1	Participation by election	0
		Budget allocation	1	Research council	1		
		Process management	1				

E. Private Sector Representatives (e.g leaders, owners,	0	Definition of the goals of the smart city / community	0	Highest decision-making body	0	Participation by appointment	0

industry chambers)							
		Elaboration of the strategy	0	Smart community / city council or its equivalent	0	Participation by election	0
		Budget allocation	0	Research council	0		
		Process management	0				

Appendix G

Axis 1: Context, Mission and Goals

Chart 1

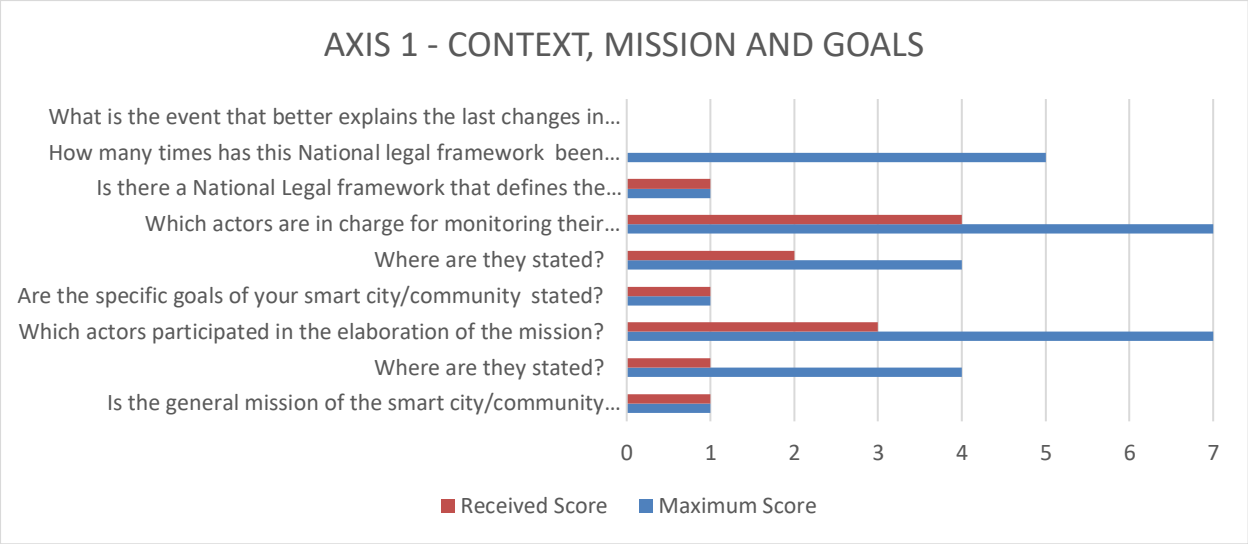


Table 13

		Maximum Score	Received Score	Potential future Score
Q1	Is the general mission of the smart city/community institution stated?	1	1	1
Q2	Where are they stated?	4	1	4
Q3	Which actors participated in the elaboration of the mission?	7	3	7
Q4	Are the specific goals of your smart city/community stated?	1	1	1
Q5	Where are they stated?	4	2	4
Q6	Which actors are in charge for monitoring their achievement?	7	4	7

Q7	Is there a National Legal framework that defines the Status of smart city/community?	1	1	1
Q8	How many times has this National legal framework been modified in the last 10 years?	5	0	
Q9	What is the event that better explains the last changes in the National Legal Framework?	NA	NA	

Axis 2: Management Orientation

Chart 2

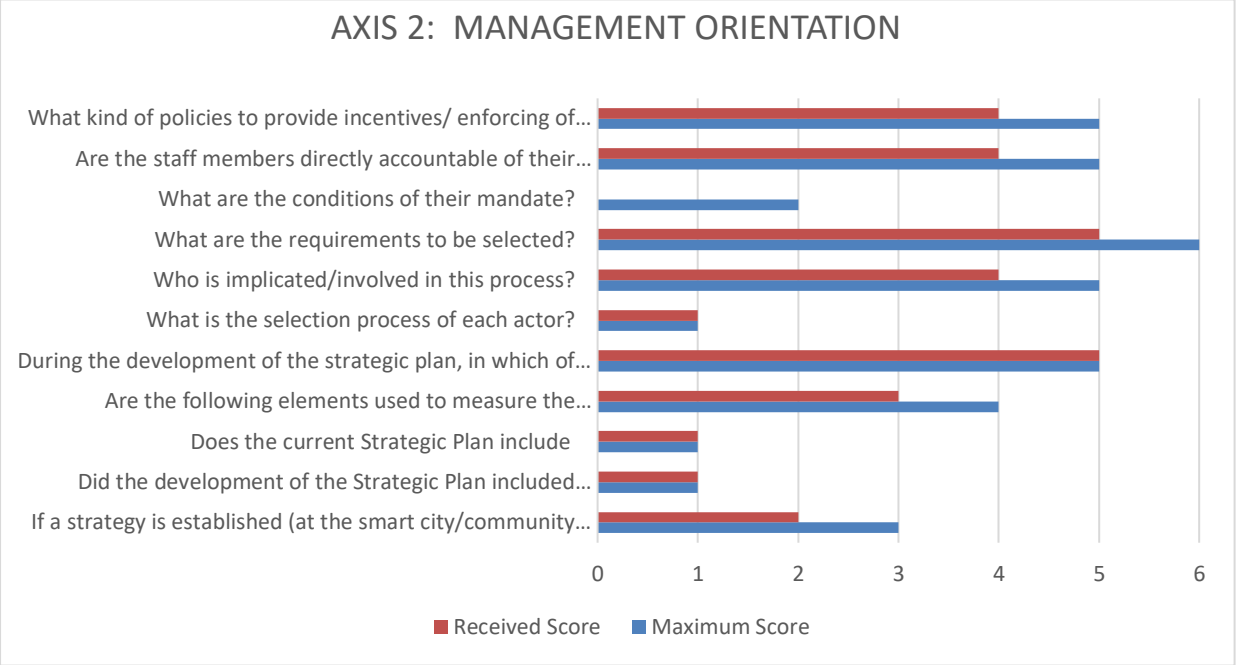


Table 14

		Maximum Score	Received Score	Potential future Score
Q10	If a strategy is established (at the smart city/community level), which means are used for its statement?	3	2	2
Q11	a. Did the development of the Strategic Plan included detailed deliberations and analysis of the following?	1	1	1
Q11	b. Does the current Strategic Plan include	1	1	1
Q12	Are the following elements used to measure the attainment of the specific goals of the strategy?	4	3	3

Q13	During the development of the strategic plan, in which of the following areas did the highest decision-making body of the smart city/community (such as governing board or other) make decisions?	5	5	5
Q14	What is the selection process of each actor?	1	1	1
Q15	Who is implicated/involved in this process?	5	4	4
Q16	What are the requirements to be selected?	6	5	5
Q17	What are the conditions of their mandate?	2	0	2
Q18	Are the staff members directly accountable of their performance to the following actors?	5	4	4
Q19	What kind of policies to provide incentives/ enforcing of rules are used to manage the staff of each department?	5	4	4

Axis 3: Autonomy

Chart 3

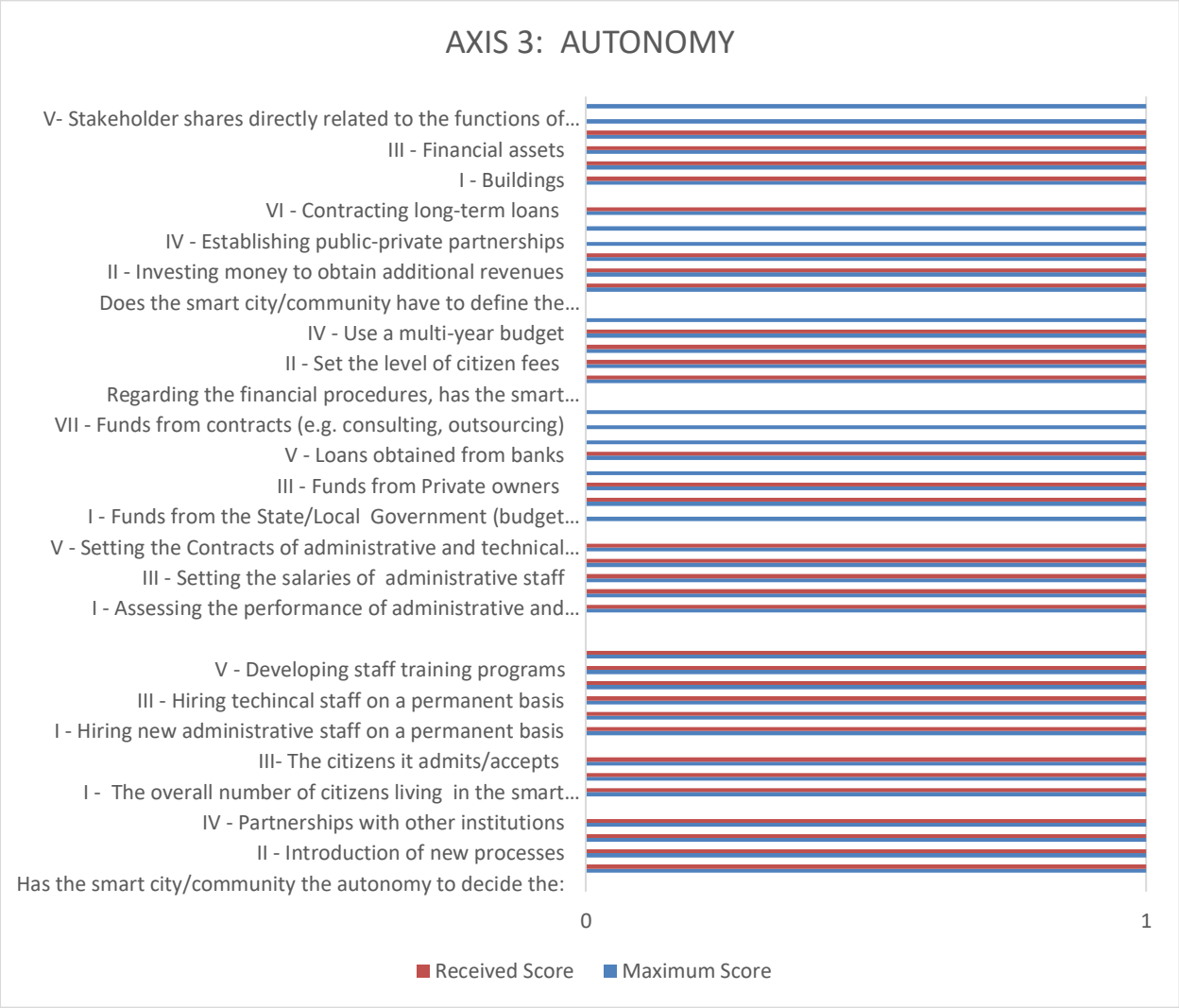


Table 15

		Maximum Score	Received Score	Potential Future Score
Q20	Has the smart city/community the autonomy to decide the:			
	I- Structure of the smart city/community (e.g. type of services, processes)	1	1	1
	II- Introduction of new processes	1	1	1

	III- Assessment of quality of life (leaving outcomes),	1	1	1
	IV- Partnerships with other institutions	1	1	1
Q21	Has the smart city/community autonomy to determine:			
	I- The overall number of citizens living in the smart city/community (e.g. is the smart city/community able to refuse applications)	1	1	1
	II- The acceptance mechanisms	1	1	1
	III- The citizens it admits/accepts	1	1	1
Q22	Regarding staffing procedures, has the smart city/community autonomy for:			
	I- Hiring new administrative staff on a permanent basis	1	1	1
	II- Dismissing administrative staff	1	1	1
	III- Hiring technical staff on a permanent basis	1	1	1
	IV- Dismissing technical staff	1	1	1
	V- Developing staff training programs	1	1	1
	VI- Promoting staff members	1	1	1
Q23	Has the smart city/community autonomy for :			
	I- Assessing the performance of administrative and technical staff	1	1	1
	II- Setting the salaries of technical staff	1	1	1
	III- Setting the salaries of administrative staff	1	1	1
	IV- Setting variable salaries (linked with performance and/or credentials)	1	1	1
	V- Setting the Contracts of administrative and technical staff (e.g. duration, benefits)	1	1	1
Q24	What are the different revenue sources of the smart city/community			
	I- Funds from the State/Local Government (budget allocation, grants, other)	1	0	0

	II-	Fees from citizens	1	1	1
	III-	Funds from Private owners	1	1	1
	IV-	Funds raised from Private companies (e.g. industries, businesses)	1	0	0
	V-	Loans obtained from banks	1	1	1
	VI-	Loans and grants obtained from International organizations	1	0	0
	VII-	Funds from contracts (e.g. consulting, outsourcing)	1	0	0
	VIII-	Revenues obtained from research grants	1	0	0
Q25	a.	Regarding the financial procedures, has the smart city/community autonomy to:			
	I-	Use unspent funds from one year to another	1	1	1
	II-	Set the level of citizen fees	1	1	1
	III-	Run a deficit	1	1	1
	IV-	Use a multi-year budget	1	1	1
	V-	Allocate the funds inside a block-grant budget	1	0	0
Q25	b.	Does the smart city/community have to define the following components of its financial structure?			
	I-	Establishing endowments	1	1	1
	II-	Investing money to obtain additional revenues	1	1	1
	III-	Using the interest gained from investments	1	1	1
	IV-	Establishing public-private partnerships	1	0	0
	V-	Issuing bonds	1	0	0
	VI-	Contracting long-term loans	1	1	1
Q26	What type of assets is the smart city/community allowed to own?				

	I- Buildings	1	1	1
	II- Land	1	1	1
	III- Financial assets	1	1	1
	IV- Equipment (Motorized, IT) and furniture	1	1	1
	V- Stakeholder shares directly related to the functions of the smart city/community	1	0	0
	VI- Stakeholder shares indirectly related to the functions of the smart city/community	1	0	0

Axis 4: Accountability
Chart 4

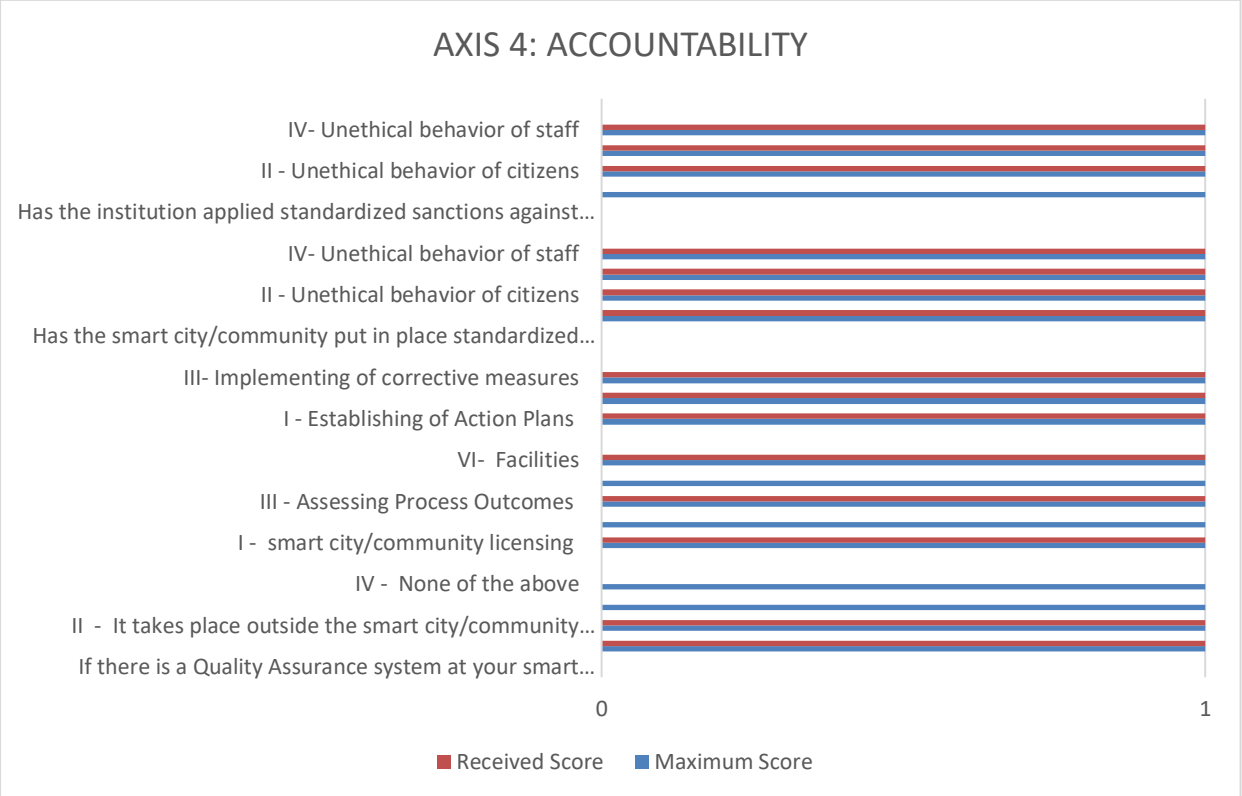


Table 16
Quality, Integrity & Transparency

		Maximum Score	Received Score	Potential Future Score
Q27	If there is a Quality Assurance system at your smart city/community, which of the ones are applicable to you:			
	I- It takes place inside the smart city/community (e.g. committee, participatory team...)	1	1	1
	II- It takes place outside the smart city/community under the responsibility of the Government	1	1	1
	III- It takes place outside the smart city/community under the responsibility of an external quality assurance specialized agency nongovernmental	1	0	0
	IV- None of the above	1	0	0
Q28	If existent, does the QA system address the following items?			
	I- Smart city/community licensing	1	1	1
	II- Accreditation of the smart city/community	1	0	0
	III- Assessing Process Outcomes	1	1	1
	IV- Research	1	0	0
	V- Facilities	1	1	1
Q29	What are the mechanisms used to follow up on evaluations' results?			
	I- Establishing of Action Plans	1	1	1
	II- Variable budget allocations are linked with results	1	1	1
	III- Implementing of corrective measures	1	1	1
	IV- Others			
Q30	a. Has the smart city/community put in place standardized sanctions against:			
	I- Fraud	1	1	1
	II- Unethical behavior of citizens	1	1	1

	III-	Noncompliance with standards	1	1	1
	IV-	Unethical behavior of staff	1	1	1
	V-	Others			
Q30	b.	Has the institution applied standardized sanctions against the following in the past year:			
	I-	Fraud	1	0	0
	II-	Unethical behavior of citizens	1	1	1
	III-	Noncompliance with standards	1	1	1
	IV-	Unethical behavior of staff	1	1	1
	V-	Others			

Chart 5

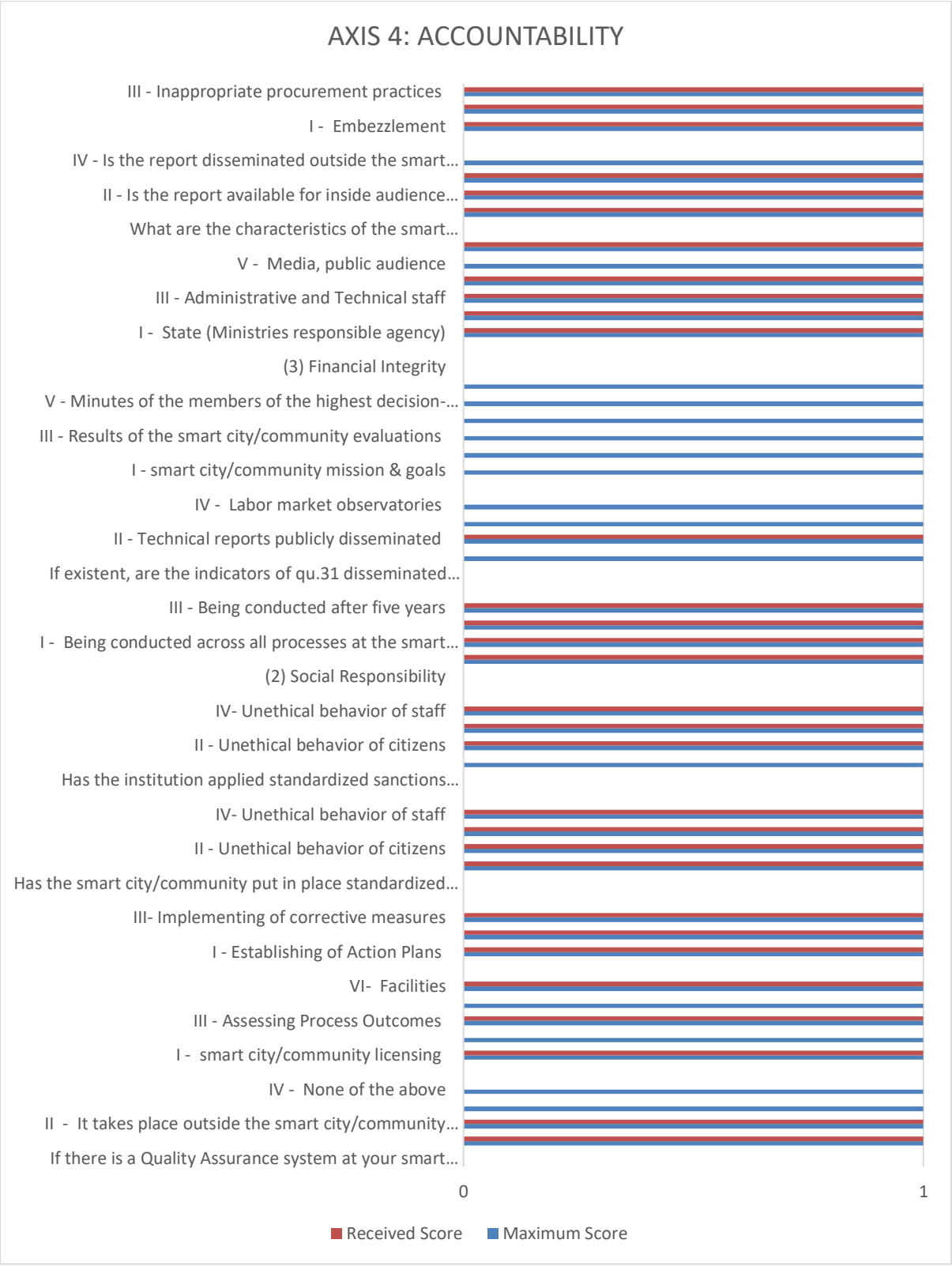


Table 17
Social Responsibility

		Maximum Score	Received Score	Potential Future Score
Q31	If existent, what are the characteristics of the tracking surveys used by the smart city/community to track its process outputs and outcomes			
	I- Being conducted across all processes at the smart city/community	1	1	1
	II- Being conducted once every three years	1	1	1
	III- Being conducted after five years	1	1	1
	IV- Being used to inform the public.	1	1	1
Q32	If existent, are the indicators of qu.31 disseminated outside the smart city/community by :			
	I- Smart city/community website	1	0	1
	II- Technical reports publicly disseminated	1	0	1
	III- Promotional reports	1	1	1
	IV- Labor market observatories	1	0	0
Q33	Are the following items disseminated by one (or more) of the means mentioned in qu.32?			
	I- Smart city/community mission & goals	1	0	1
	II- Strategic plan of the smart city/community	1	0	1
	III- Results of the smart city/community evaluations	1	0	1
	IV- Financial statements	1	0	1
	V- Minutes of the members of the highest decision-making body	1	0	1
	VI- Social responsibility and sustainability report	1	0	1

Financial Integrity

		Maximum Score	Received Score	Potential future Score
Q34	Are the financial documents available and/or reviewed by the following stakeholders:			
	I- State (Ministries responsible agency)	1	1	1
	II- Senior Technical and administrative staff	1	1	1
	III- Administrative and Technical staff	1	1	1
	IV- Citizens	1	1	1
	V- Media, public audience		0	0
	VI- Donors		1	1
Q35	What are the characteristics of the smart city/community financial audit:			
	I- Is it conducted by an external body?	1	1	1
	II- Is the report available for inside audience [leadership]?	1	1	1
	III- Is the report available for general inside audience?	1	1	1
	IV- Is the report disseminated outside the smart city/community or made public?	1	0	1
Q36	Does the smart city/community have in place and enforces standardized sanctions against:			
	I- Embezzlement	1	1	1
	II- Inappropriate spending (failure to present justifications)	1	1	1
	III- Inappropriate procurement practices	1	1	1

Additional Questions Axis 4 - Important: please give more precision, if relevant, about the following items:		
Who leads the mechanisms used to follow up on evaluations' results of the QA system? And how frequently is this done?		
When was the last time that a smart city/community self-assessment was conducted?		
When was the last time that the smart city/community was accredited? By whom?		
When was the last time that the smart city/community was certified? By whom?		
When was the last time that one of the sanctions of qu.30 has been applied?		
If the smart city/community financial audit is available to inside audience, who are they? Please list.		
Does the smart city/community follow a standardized process for procurement?		

Notes		

Axis 5: Participation

Table 18

Q37	Do the following stakeholders have a formal and active mode of representation?		Potential future Score
A.	Citizens	0	1
B.	Technical Staff	0	1
C.	Administrative Staff	0	1
D.	Private Donors / Owners	1	1
E.	Private Sector Representatives (e.g leaders, owners, industry chambers)	0	1

Q38	Do they actively participate in the decision-making for the following items:		Potential future Score
A.	Citizens	I- Definition of the goals of the smart city/community	0	1
		II- Elaboration of the strategy	0	1
		III- Budget allocation	0	1
		IV- Process management	1	1
B.	technical Staff	I- Definition of the goals of the smart city/community	0	1
		II- Elaboration of the strategy	0	1
		III- Budget allocation	1	1
		IV- Process management	1	1
C.	Administrative Staff	I- Definition of the goals of the smart city/community	0	1
		II- Elaboration of the strategy	0	1
		III- Budget allocation	1	1
		IV- Process management	1	1

D. Private Donors / Owners	I- Definition of the goals of the smart city/community	1	1
	II- Elaboration of the strategy	1	1
	III- Budget allocation	1	1
	IV- Process management	1	1
E. Private Sector Representatives (e.g leaders, owners, industry chambers)	I- Definition of the goals of the smart city/community	0	1
	II- Elaboration of the strategy	0	1
	III- Budget allocation	0	1
	IV- Process management	0	1

Q39	Do they have representatives on the following boards/councils?			Potential future Score
A. Citizens	I- Highest decision-making body	0	1
	II- Smart city/community council or its equivalent	0	1
	III- Research council	0	1
B. technical Staff	I- Highest decision-making body	0	1
	II- Smart city/community council or its equivalent	0	1
	III- Research council	0	1
C. Administrative Staff	I- Highest decision-making body	0	1
	II- Smart city/community council or its equivalent	0	1
	III- Research council	0	1
D. Private Donors / Owners	I- Highest decision-making body	1	1
	II- Smart city/community council or its equivalent	1	1
	III- Research council	1	1

E. Private Sector Representatives (e.g leaders, owners, industry chambers)	I- Highest decision-making body	0	1
	II- Smart city/community council or its equivalent	0	1
	III- Research council	0	1

Q40

Do they have representatives on the following boards/councils?			
A. Citizens	I- Participation by appointment	0	0
	II- Participation by election	0	1
B. technical Staff	I- Participation by appointment	0	0
	II- Participation by election	0	1
C. Administrative Staff	I- Participation by appointment	0	0
	II- Participation by election	0	1
D. Private Donors / Owners	I- Participation by appointment	0	0
	II- Participation by election	0	1
E. Private Sector Representatives (e.g leaders, owners, industry chambers)	I- Participation by appointment	0	0
	II- Participation by election	0	1

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- Provides results of AXIS 5 in a Chart Form with summary questions table 18

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