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LE ROLE DES MÉDIAS SOCIAUX DANS LA CO-CRÉATION DES UTILISATEURS ET DANS L'INNOVATION DE SERVICE

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THE ROLE OF SOCIAL MEDIA IN USER CO-CREATION AND SERVICE INNOVATION

DOCTORAL DISSERTATION

Ljubljana and Lille, 2015

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AUTHORSHIP STATEMENT

The undersigned Miha Uratnik a student at the University of Ljubljana, Faculty of Economics, (hereafter: FELU), declare that I am the author of the doctoral dissertation entitled "The Role of Social Media in User Co-creation and Service Innovation", written under supervision of prof. Miha Škerlavaj and co-supervision of prof. Faïz Gallouj.

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Summary

The pervasive availability of social media is changing the way organizations interact with the user in service innovation. This not only highlights the co-production, but also the co-creation, relationship. However, an explanation of how to leverage either relationship in interactional service innovation with the social media is currently missing. This research found that the integration of such interactions reveals a system of different contexts and hierarchical levels in the conception and creation of knowledge production and dissemination.

The system that was identified reveals a potential configuration of hypothetical interactions that could be leveraged with the social media. Namely, the gap between the social media and service innovation networks across different sectors is identified and narrowed using interactional service innovation with the user of social media through co-production and co-creation relationships. The interest here is not only in how to acquire/retain certain users in their adoption of technology or co-production of information, thereby increasing the value of the organization's offering, but rather to understand how organizations leverage non-technological innovation and complex meta-change with the omnipresence of social media in different environments of an emerging economy.

This problem was tackled with the exploratory sequential research; qualitative, leading to quantitative, methodology. In the first step, five companies were investigated over a long-term span. A particular qualitative methodology of inductive and deductive research was used for the validation of the interactional model. However, the results led to the quantitative validation of a larger sample. This involved the collection of data and evaluation of different hypotheses as theorized in the qualitative step.

The research discovered that companies leverage social media for interactional service innovation differently in their organizations. Indeed, companies interact with the user of social media and co-produce value. Although social media seem significant for co-creation, in fact the findings show that companies do not harness the possibilities of co-creation with social media because they mainly co-produce value through scarce unique interactions with the social media user in service innovation networks across different sectors.

Keywords: interaction, service innovation, social media, co-creation of value, co-production of value, user innovation.

Résumé

La généralisation des médias sociaux change la façon dont les organisations interagissent avec les utilisateurs dans le cadre de l'innovation de service. Elle met en lumière non seulement des relations de co-production, mais également des relations de co-création. Cependant, l'analyse de ces relations entre l'innovation dans les services interactionnels et les médias sociaux fait actuellement défaut. Dans cette thèse, l'intégration de telles interactions met en évidence différents niveaux hiérarchiques dans la conception et la création de la production de la connaissance, ainsi que dans sa diffusion.

Le système identifié révèle une configuration potentielle d'interactions hypothétiques qui pourraient être mises à profit avec les médias sociaux. En particulier, l'analyse a permis d'identifier et de réduire l'écart entre les médias sociaux et les réseaux d'innovation dans les services dans différents secteurs en utilisant l'innovation de service interactionnelle réalisée en coopération avec l'utilisateur des médias sociaux grâce à des relations de coproduction et de co-création. L'intérêt ici ne réside pas uniquement dans la co-production d'information, qui augmente ainsi la valeur de l'offre de l'organisation, mais dans la compréhension de la manière dont les organisations mettent à profit l'innovation non technologique et le méta-changement complexe en lien avec l'omniprésence des médias sociaux dans divers environnements d'une économie émergente.

Ce problème a été abordé à travers une recherche exploratoire séquentielle qualitative, puis quantitative. Dans une première étape, cinq entreprises ont été étudiées sur une longue période à travers une méthodologie qualitative particulière qui a permis la validation du modèle interactionnel. Ensuite les résultats ont conduit à la validation quantitative sur la base d'un échantillon plus important des différentes hypothèses formulées lors de l'étape qualitative.

La thèse montre que les entreprises exploitent les médias sociaux pour l'innovation de service interactionnelle différemment au sein de leurs organisations. En effet, les entreprises interagissent avec les utilisateurs de médias sociaux et produisent ensemble de la valeur. Bien que les médias sociaux semblent importants pour la création conjointe de valeur, les résultats soulignent toutefois que les entreprises ne maitrisent pas les possibilités de co-création car elles co-produisent principalement lors d'interactions isolées avec les utilisateurs de médias sociaux dans les réseaux d'innovation de services à travers différents secteurs.

Mots-clés : interaction, innovation de service, médias sociaux, co-création de valeur, co-production de valeur, innovation de l'utilisateur.

Povzetek

Vsesplošna dostopnost družbenih omrežij vpliva na način, kako organizacije sodelujejo z uporabniki pri inovacijah v storitvah. To ne vpliva le na soproizvodnjo vrednosti, temveč tudi na njeno soustvarjanje. Vendar manjka razlaga, kako ti odnosi s pomočjo družbenih omrežij vplivajo na interakcijske storitvene inovacije. Vključitev takih interakcij opredeli sistem različnih kontekstov in hierarhičnih ravni pri ustvarjanju ter proizvodnji znanja in njegovem širjenju.

Opredeljeni sistem omogoča postavitev hipotetičnih interakcij z družbenimi omrežji. Obstaja namreč vrzel med družbenimi omrežji in omrežji inovacij v storitvah v različnih sektorjih, ki jo je mogoče zapolniti s pomočjo interakcijskih inovacij v storitvah z uporabniki družbenih omrežij. Uporabniki družbenih omrežij sodelujejo z organizacijami v odnosu soproizvodnje in soustvarjanja. Pri tem ne gre le za vprašanje, kako pridobiti oziroma ohraniti določene uporabnike in tehnologije pri soproizvodnji vrednosti, ki jo ponudi organizacija. Veliko bolj se postavlja vprašanje, kako organizacije povezujejo netehnološke inovacije ter kompleksne meta spremembe z vsesplošno prisotnostjo družbenih omrežij v različnih okoljih nastajajoče (digitalne) ekonomije.

Opisanega problema smo se lotili s pomočjo integracije raziskovalnih metod tako, da je kvalitativna metoda vodila v kvantitativno. Skozi daljše časovno obdobje je bilo pet gospodarskih družb predmet kvalitativne raziskave, ki je sledilo izgradnji in presoji interakcijskega modela, s pomočjo induktivnega in deduktivnega sklepanja. Na podlagi kvalitativnih rezultatov so bile postavljene hipoteze interakcij med uporabnikom in organizacijo, ki smo jih kvantitativno preizkusili na večjem vzorcu.

Ugotovili smo, da gospodarske družbe uporabljajo družbena omrežja za interakcijske inovacije v storitvah glede na posebnosti organizacije. Vsekakor gospodarske družbe sodelujejo z uporabniki družbenih omrežij in soproizvajajo vrednosti. Čeprav se zdi, da so družbena omrežja koristna tudi za soustvarjanje, iz dobljenih rezultatov ne izhaja tak zaključek. To ugotovitev potrjuje tudi kvantitativni del raziskave. Ugotavljamo, da gospodarske družbe ne izkoriščajo možnosti soustvarjanja, temveč raje soproizvajajo vrednosti prek redkih edinstvenih interakcijah z uporabniki družbenih omrežij v različnih sektorjih.

Ključne besede: interakcija, storitvene inovacije, družbena omrežja, soustvarjanje vrednosti, soproizvodnja vrednosti, uporabniške inovacije.

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INTRODUCTION

"It is hardly possible to overrate the value, in the present low state of human improvement, of placing human beings in contact with persons dissimilar to themselves, and with modes of thought and action unlike those with which they are familiar." J.S. Mill (Mill, 2004, p. 174)

Scientific field of research and problem definition

The ubiquitous availability of information and communication technology (ICT) in general, and social media (SM) in particular, are causing a change in the way innovation gets done in (modern) service innovation economies. SM are highly interactive platforms with which individuals and communities share, co-create, discuss, and modify user-generated content (Kaplan & Haenlein, 2010). Some examples are micro blogging (Twitter), professional networking sites (LinkedIn), and social networks (Facebook).

On the one hand, SM are new technologies that create "a distance between the company and its customers; i.e., customers do not interact with the employees – they meet technology" (Edvardsson, Gustafsson, Kristensson, & Witell, 2011, p. 303). This implies that SM make it more difficult for the employee to understand the customer and influence his or her ability to articulate what he/she needs and wants via SM.

On the other hand, the opportunities of SM allow companies to interact with people that are connected across groups. Consequently, such people "are more familiar with alternative ways of thinking and behaving, which gives them more options to select from and synthesize" (Burt, 2004, pp. 349–350). This implies that SM may have a positive impact on companies' innovation due to information brokerage, creativity and social structure. Either way, SM drastically improve the interactions. This presents a challenge and an opportunity for companies to identify and use knowledge gathered via this technology.

Notions of SM interactions were already presented in 1968 when Doug Egelbart demonstrated the value of computational interactions for the office.[1] Today we can also observe such interactions with the developments of service innovation with the SM. For instance, interactions (among intangibilities) are one of the essential service innovation activities. With all this in mind, we enter the world of service innovation with the SM

[1] For instance, different methods of human–computer interaction, such as mouse, hypertext, networked computers, and precursors of graphical user interface are demonstrated.

user. Thus, users are considered as facilitators of innovation due to new ICT channels such as SM. For example, the ideas of crowdsourcing (Howe, 2006),[2] cognitive surplus (Shirky, 2010)[3] and the power of human cooperation (Benkler, 2011),[4] namely as social or nonmarket interactions in production of information and knowledge (Benkler, 2006), have motivated companies to leverage users around the globe via SM.

Service innovation research unfolds roughly at the same time as ICT, and research into service innovation economy is maturing only recently. Interestingly, the notion of the interactional relationship, including its intangible dynamics of value in use by the customer (e.g. co-creation), can already be traced much earlier. For instance, it was already formulated by others how customers are importnant in services (e.g. Bastiat, 1860; Fleetwood, 1997; Ricardo, 1817). However, our aim is not to explore the history of services and user involvement, but rather to examine service innovation with the interactional activities of SM.

Modern service and innovation economies suffer from two major gaps (Djellal & Gallouj, 2010). The "innovation gap" reveals that service innovation is a subject of knowledge development that is not necessarily measured with typical innovation indicators, such as R&D and patents. The "performance gap" shows that output of services and of service innovation performances and the evaluation of their performance requires multi-criteria indicators, and not only measurements of performance such as current economic tools of productivity and growth. The purpose of this thesis is consideration of the dynamic interaction between the user of SM and the organization during service innovation. We suggest that this kind of service innovation is narrowing the innovation and performance gaps in service economies in general, and is emphasizing the need for measurements of SM users' activity in innovation.

In this thesis we argue that SM are one of the building blocks of the (virtual) economy due to the interactional service innovation conveyed with a user. The SM connect people according to socially desirable needs, rather than technological "lists of certain data". In this case, the technology from the local context is integrated. Needless to say,

[2] Obtaining ideas, services, content, etc. from large groups of people, usually from the on-line community, not from employees/suppliers.
[3] Due to enormous connectivity around the globe people share, create and collaborate in different ways. This is leading to generation of information that was previously unreachable.
[4] The availability of enormous interactivity via SM human cooperation is transforming business, governments, and society at large. Due to the low cost of collaboration there are fewer limits to what human cooperation can achieve together.

the fastest-growing companies focus on the relationship with the customer. For instance, the customer is in the centre of value production/creation from digitization due to processes which automate, integrate, and coordinate users' activities and increase revenue in shared services, operations, and customer-facing activities (Woerner, McDonald, & Weill, 2012). Recently, it has been claimed that such activities bring growth to the country's economy (Banfi, Florian, & Eric, 2014; Manyika, Lund, Robinson, Valentino, & Dobbs, 2015).

Research methodology

The focus of our research is on companies and their service innovation relationship with the users of SM. In other words, the investigation is concentrated on the configuration of interaction between different resources, including people, information and technology. Fundamentally, the value is considered in use (integration and application of resources in a specific context), rather than in exchange (embedded in a firm output and captured by price).

We tackle the investigation with exploratory sequential research for specific reasons. Firstly, the phenomenon of SM reveals a recent, active and fast-moving target, yet complex and with scant evidence in service innovation (Aral, Dellarocas, & Godes, 2013; Kaplan & Haenlein, 2010). For instance, at the time of research the variables of service innovation with the SM were unknown and there was no guiding framework/theory. Secondly, similar service innovation studies also followed the sequential research, which is not surprising bearing in mind service specificities (see Chapter 2). For instance, such studies firstly adopt the qualitative stage, and then as a second step follow the quantitative approach, namely the collection of data to hone the empirical instrument under analysis with a more rigorous test, particularly to determine if the instrument can be confidently used on a larger sample.

Although we followed the typology-based design of mixed methods as the most discussed type in literature, it was our interest in research questions that played a dominant role (Creswell, Plano Clark, Gutmann, & Hanson, 2003; Bryman, 2006). For instance, in our literature review we noticed that studies of service innovation with the SM are more or less non-existent. Consequently, we have built our own systematic framework of interactional service innovation with the SM through which we derived the empirical instrument for further empirical analysis. Nevertheless, we relied on a

typical method of mixing the qualitative and quantitative research (Bryman, 2006; Greene, Caracelli, & Graham, 1989).

Our empirical validation is based on sequential timing. The first study began with the qualitative collection and analysis of data. Building on the exploratory results, we have done a second, quantitative study and test the initial findings (instrument). Consequently, we have created a statistical model to generalize the results on a larger sample. At the end we have interpreted how the quantitative results build on the initial qualitative results. For example, the qualitative study involved a custom methodology with which we have empirically investigated the concept of interactional service innovation with SM. Considering the resulting categories/variables, we have discussed and proposed different hypotheses for the assessment of the overall prevalence on a larger sample of informants.

The primary purpose of our methodology was to generalize the qualitative findings based on a few individuals from the qualitative phase on a larger sample gathered during the quantitative phase. Due to our research field, the exploration approach was indispensable. For example, our research suffered due to the measurements/instruments. Consequently, our design was begun qualitatively, since this approach is best suited for such problems. For instance, the problem of interactional service innovation with the SM is more qualitatively oriented; the important constructs were unknown to research, and relevant quantitative instruments were not available; the level of resources was limited, and required a design where only one type of data was being collected and analysed at a time; new emergent research questions based on qualitative results were identified and could not be answered with the available data. In addition, it is useful to first approach the design and then test the instrument, identify important variables for the quantitative study and then generalize the qualitative results on different groups in case one group is not available (e.g. V. L. P. Clark & Creswell, 2011).

With regard to the philosophical assumption, we have worked as a constructivist would during the first phase of the study, namely to value the multiple perspectives and deeper understanding. When we moved to the quantitative phase, the underlying assumptions rather shifted to the post-positivist principles and guided the need for identifying and measuring variables with statistical trends.

Intended contributions

Although SM enable users to participate collectively in the processing of information in service innovation, at the time of this research and to our knowledge there was little to no explicit theory in that regard. It could be said that service innovation and SM present an enormous gap in the research field of services. For instance, service innovation inherently involves the medium, while the literature of new media (i.e. SM) is very much in line with the service innovation research. In addition, SM imperatively involve the user as well as services. This combination empowers users to go beyond services and leverage experiences where embodied knowledge (not just information) is central to guide certain transformations and enlarge the gap.

With this thesis I seek to narrow this gap, and the main assessment should unfold three contributions. Firstly, I intend to contribute with the synthesis of service innovation literature, including user involvement and relationship, and provide the concept. I will present this concept with regard to SM literature and identify technological and non-technological specificities. Subsequently, I will reason embodied knowledge integration and seek to find how the innovation gap and performance gap in service innovation can be narrowed with the use of SM.

Secondly, I will contribute a systematic framework with respect to SM. I seek to narrow the performance and innovation gaps in services with the conceptualization of the systematic framework of interactional service innovation with the SM. In this case, I will provide a complex socio-techno-economic adaptive system with mutually dependent elements. Essentially I will focus on two steps. In first step, I will provide the systematic framework, where I will seek the interactional innovation with the SM. In the second step, I will seek conceptualization of the interactional innovation and suggest a theory and model.

Thirdly, I will contribute with leveraging the appropriate methodology for the research. I will unfold the qualitative research with this particular methodology. The intention is to contribute with the empirical validation of interactional service innovation with the SM user. Specifically I will seek to validate the interactional innovation model and theory. In addition, I will seek different implications and identify future research of interactional service innovation with the SM. Furthermore I will seek to justify the model for empirical validation on a larger population. Namely I will perform the

quantitative analysis and seek support for the hypotheses that I will propose with regard to the interactional innovation with the SM.

This thesis is further disposed as follows. In Chapters 1 and 2 I provide a literature review of SM and service innovation with the user involvement. At the end of Chapter 2 I synthesize and explain the concept of User-Based Service Innovation (USBI) in relation to the technological and non-technological specificities to SM, including embodied knowledge integration and implications for the innovation and performance gaps. Modern economies are service innovation economies that leverage "networks of networks" of human needs and wants as value in use, also identified with the user of SM interactions. In Chapter 3 I conceptualize the systematic framework to capture such networks of SM interactions in different contexts with the embodied knowledge as different integrated systems. I empirically validate the interactional service innovation with the user of SM in Chapters 4 and 5. Afterwards I provide the general conclusion with the study's theoretical and practical contributions, and an agenda for future research.

1. PERSPECTIVES ON SOCIAL MEDIA FOR ORGANIZATIONS

The purpose of this chapter is to show the complexity of SM. The SM involve unseen interactions as part of 21st century technologies[5] and economies where knowledge alone will enable the use of them. The SM are not typical mass media, but rather a *new (collaborative) medium*. Their production is based on properties of the economy of *information, globalization and network* (e.g. Castells, 2011). It is *informational* because the productivity and competitiveness of users, firms, regions or nations (agents) primarily depend on the capacity to generate, process, and efficiently apply information and knowledge. It is *global* because the core activities of production, consumption and circulation[6] are organized on global scale, either directly or through a network of linkages between economic agents. It is a *network* because productivity is generated through a network of interactions between business networks.

In this chapter we focus on shortcomings and benefits of SM in technological, social and economic terms. Although SM enable users to participate collectively in processing of information and knowledge in service innovation, to our knowledge there is no explicit theory in that regard. In any case, *knowledge and information are considered in this chapter from the economic perspective, namely in section 1.4*. This chapter is divided into four parts. The first part takes a broad descriptive view of what SM are. In the second, third and fourth part, theoretical views on the SM are presented and considered in terms of technical, social and economic theories.

1.1. An overview of the notion of social media and its challenges

A complete description of SM would be an endless process, because SM are a complex and moving research target – transformative per se. Anyway, the complexity in general and in SM in particular consists of nascent collection of interactive parts. We describe the interactive parts of SM in terms of power, innovation and interactions between physical and digital (transformative) economies. The purpose is to describe the emergence of SM: what it can enable, to whom, and what its implications and consequences are – these will be addressed in the other three parts. In general, SM enable their users to process information usually for little or no cost. Such information processing (e.g. dissemination, distribution, diffusion or manipulation) is changing not

[5] Such as genetics, nanotechnology, and robotics, for example.
[6] Including their components – capital, labour, raw materials, management, information, technology, and markets.

just society, work, innovation and the local environment, but also their conditions and requirements for innovation.

SM enable users to employ available technologies and infrastructures and engage with on-line or off-line goods, products and services to collaborate and improve productivity. The printing press diffused science with publication, which also enabled better collaboration, eventually social production that also spurred economic growth (Benkler, 2006). Past and future collaboration has been recently considered by different literature about SM, namely integration of cognitive capacities around the globe with crowdsourcing (Shirky, 2008, 2010; Surowiecki, 2005); and the emergence of a new consumer type (Kleemann, Voß, & Rieder, 2008). Certain powers of SM are transforming the economy in many fields; exploiting previously introduced ideas of ICT in 1968 (Rheingold, 1993). But this time the technology is integrating a much wider scope of knowledge processing in comparison to past research experiments, due to the evolution and network economics that are in turn co-evolving recombinant service innovation. Today, the SM are a mostly free and widely available use of service applications, while in the mid- and long-term they will be more involved in general daily activities to leverage information from various sources (Ahlqvist, Bäck, Halonen, & Heinonen, 2008).

1.1.1. Power of social media co-evolves with the society

The description starts with the term "social media". The *social* word integrates the properties of collective creation and maintenance of shared information or content by its users[7]. The *media* word is considered here as *socio-technical space* where a particular creation/production of value or subject of concern is dealt with by the society in economic terms. Due to the latest technological advances and capabilities the societies in turn access millions of services via software, hardware or application-use. Indeed, the interoperability of the medium (e.g. Internet) offers transcendental connectivity between technological, social and economic factors. The connectivity involves many dimensions, layers or components, especially in terms of information network processing society.

The phenomenon of SM is relatively new. It is probably best known for the rise of the civil Arab Spring in 2010 (Pollock, 2011). In this case, the SM showed the *powers of*

[7] The user is considered as anybody who is using SM for any kind of purpose (individual, organization or nation).

organization and communication, particularly processing and diffusion of information and knowledge in society to achieve certain goals beyond current institutional organization. For instance, the patterns of SM help to reveal the complexities of certain conflicts in the developing world (O'Callaghan et al., 2014). The evidence is that under weak institutions, popular mobilization and protests have a role in restricting the ability of connected firms to capture surplus rents. Today's national government agencies consider the SM as a tool for exploring different regional operations in such environments (Mayfield III, 2011). This is particularly used for battles forecasting due to (consideration of) information flows in a region/society. In addition, notions of connecting data are leveraged with the "entrepreneurship government" in innovation (Salem & Mourtada, 2012; Criado, Sandoval-Almazan, & Gil-Garcia, 2013). Finally, the power of SM is evident in how younger generations are exploring education, specifically in processing knowledge (Boyd, 2014; Alexander, 2006) with positive qualitative effects (Silvia & Beatriz, 2012).

1.1.2. Social media and innovation

Innovation is in many domains creating a compounding effect in the evolutionary course. This is especially the case of information and network industries, which SM are part of. Due to the networks economies, the widespread of SM enables manipulation and provision of information by its users who are not necessarily employees of an organization, but rather average citizens with a need/wants of particular services. The application of SM enables sharing and therefore connecting its features – modularly. There are several SM platforms with open public access e.g. Facebook, Twitter or LinkedIn – used daily in different ways. However, there are also private companies that harness SM users to develop customized (new SM) services and automate the Web, combining different services and allowing users to create the service they need (e.g. Zappier). Needless to say, this is creating new relationships through linking data with code across different silos (Heath & Bizer, 2011).

In general, the world is captured by code, while code is embedded in the world. In this case, the code becomes the interplay, not just in terms of law, jurisprudence and its effects on technology (Lessig, 1999), but also in technological terms per se as a systematic representation, etc. Although essentially the information-processing mechanisms are harnessed in energy and material, the technology we are referring to is language, namely code: "*Any system of symbols and rules for expressing information or*

instructions in a form usable by a computer or other machine for processing or transmitting information." *(Oxford English Dictionary)*

Technology-language, the consequence, enables the creation, emergence and operation of SM. For instance, the early beginnings of computers connected to the Internet are apparent in the need to share information between scientists. Although at a different level, such effects of technology-code can be observed in the case of Open Source Software (OSS) (Weber, 2004). In this case either the language or code is not hidden anymore. For instance, in most cases the code is hidden or even protected. However, several companies are today releasing their patent information and data in terms of *open-source movement* with the hope of making faster production (e.g. GE to Quirky, Tesla to public). With regard to the ICT and OSS this occurred much earlier (e.g. Spinellis & Giannikas, 2009).[8] Therefore, the code/language and information is increasingly visible globally, while the users of SM are part of service innovations and experiences in the economy of different sectors. Currently, the investors and consumers are pleased about such services/economies; however, regulators and competitors are not so sure (The Economist, 2014).

Code is usually applied to physical objects and is hard to operate by non-experts. We are referring to the social dimension of SM, namely the connection with the physical world. *Firstly*, we cannot touch the code, because that requires a physical property. In this case, the code is not hidden from the physical senses such as touch, smell or hearing, etc. Of course, the sensory appropriation gives little or no understanding of how to manipulate the code. *Secondly*, code is fungible, which means that sometimes it has to be improved, errors must be found, incompatibilities considered, etc. Therefore, code is not only abstract and disembodied; it is ubiquitous and increasingly fungible. "A GPS location becomes a SM posting becomes a mash-up becomes a song becomes a video becomes a game move." (Jordan, 2012, p. 236). *Thirdly*, the judgement of value is embedded in code. Therefore, the code either instructs the hardware to do a particular operation, or it records a value (the product of having done something) for the future

[8] Large corporations and holders of IP (e.g. Apple, IBM, Sun, and Oracle) have embraced the OSS communities by encouraging the participation of their own personnel in, and donating copyrighted software and patents to, these communities, and integrating the OSS into their strategic product and service offerings.

recall and potential manipulation. "Code codifies values, and yet, oddly, most people speak of code as if it were just a question of engineering" (Lessig, 1999, p. 59).[9]

Indeed, data requires additional data to be defined by more data – metadata. In other words, if we provide a picture on SM, this has little use for the SM provider without creating new data (analysis/tagging), for example. Metadata is phenomenally part of extremely broad digitization and connectedness. For instance, aggregation of personal data is ubiquitous in the era of SM. Indeed, social metadata is becoming increasingly important and without it SM would be just another structure. For instance, Facebook is in essence a gigantic metadata generation and distribution system. ("I liked the concert," "The person who liked the concert did not know the name of the singer..." etc.). Facebook institutionalized the collection of conversations as one vast, logged, searchable metadata repository. Therefore, several technologies are emerging on the basis of the SM. For instance, online vehicles for listening to music, taping industry information, reviewing and commenting on what friends are listening to, are just a few of the most popular (e.g. Spotify).

1.1.3. Interaction between the physical and digital economies

The SM enable different mechanisms of interaction in society as emergent social structures across domains of human activity, which to some extent enable and are part of experiences of the fifth technological information and telecommunication revolution (cf. Freeman & Soete, 1997). In comparison to the industrial revolution, this revolution is economically characterized by new technologies and new redefined industries due to lower costs and faster information diffusion. In addition, it has a redefined infrastructure with the properties of information sources and connections in the space of socio-cognitive flows of innovation that is increasingly organized around networks of different contexts.

SM are emerging from such systems to transform business and service innovation either inside or outside the company. Inside the companies, employees are using SM at work to exchange and use particular information. While outside the company, SM empower millions to interact between each other or via other mediums. For instance, the users of SM daily *"talk back"* to other media (e.g. TV). Companies are decoding "*merged*"

[9] Needless to say, code is getting tremendous attention around the globe (e.g. Scratch, Code.org).

information of several SM users and display products in line with the broadcasting and advertisement (Talbot, 2011).

SM are used in connecting the on-line and off-line services in different sectors. A typical example is the use of community participation in advanced driving services, namely Waze. The users of the Waze community help the GPS systems, essentially the drivers, to take a different route when there are bottlenecks on the shortest route suggested by a typical GPS technology. A different example is LinkedIn, where companies are recruiting people, either for the work placement or innovation process. When people have the chance to participate, then we are talking about (citizen) collaboration, not just in service delivery, but also in service innovation.

We have noted that SM are spreading into the "physical world". Indeed, companies are integrating the use of SM into cars (Fitzgerald, 2014). But what is more interesting is that the physical object, namely the car, is seen as a social medium. SM are extended into the physical environment even further with the introduction of a micro-marketplace, e.g. Wonolo, Fiverr, Elance. For instance, the users of Wonolo create a profile and wait to be called for work whenever they desire to. There are other such "crowdsourcing" services (Cheung, 2012; Lease & Yilmaz, 2013). In terms of human intelligence tasks the most famous is Mechanical Turk (Berinsky, Huber, & Lenz, 2012).

SM are also part of (mobile) collaboration transformation with productive results (Greenwald, 2014). For instance, workers can do much of their work outside the office, when commuting to work for example. Division of labour is increasing further with the access to more information. On the one hand, the abundance of SM offers ubiquitous processing of information. On the other hand, the scarcity of particular information on SM is challenging in an information economy. The line between property (private and public), space (working and home environment) and time is disappearing, which is challenging encounters at work with the problem of privacy (Sánchez Abril, Levin, & Del Riego, 2012). Due to SM, consumers are interacting with the value of the company's goods/products or services whenever they desire. Hence the asynchronous availability of SM is changing the economy of innovation cycles and the introduction of new technologies is coming to the forefront with integrated social determinism.

1.2. Technological perspective

We cannot theoretically predict the future development of technology in regard to SM due to its "liveliness". However, we assume that once the ICT reaches saturation in terms of connectivity (ideally when each citizen is connected to the Web),[10] other scientific disciplines will receive more attention, including integration of the physical world, especially in the production of the individual user. This will further emphasize the evolution of technology in terms of innovation. The SM are part of the new information technology paradigm, "seen as a shift from a technology based primarily on cheap inputs of energy to one predominantly based on cheap input of information derived from advances in microelectronic and telecommunications technology" (C. Freeman, 1988, p. 10).

We are living in (a new) transformation of our "material culture" by the work of a new technological paradigm organized around ICT (C. S. Fisher, 1992). Technology is "the use of scientific knowledge to specify ways of doing things in a *reproducible* manner" (Brooks, 1971, emphasis added by Bell, 1976, cited in Castells, 2011, p. 29 footnote 4.), while ICT is the converging set of technologies in microelectronics, hardware and software, including telecommunications/broadcasting, and optoelectronics (Saxby, 1990)[11]. Essentially "*the core* of the transformation we are experiencing in the current revolution refers to the *technologies of information processing and communication*" (Castells, 2011, p. 30). The key role of science, knowledge and information for innovation was firstly found in R&D labs in Germany's chemical industry of the 19th century (Mokyr, 1990). *But this time we observe service-related phenomena of SM that are characterized by the application of knowledge and information for new knowledge generation and information processing with a cumulative feedback loop between innovation and its use. This is how the current technological revolution is characterized (e.g. Saxby, 1990).*

The first technological experiments of the ICT interactions are well known in the histories of the Minitel in France and the ARPA Internet project in the USA. In general, both were induced by the State to react to the ICT revolution with the very different cultures and institutions of their respective societies. In short, in 1994 "Internet: [was]

[10] Apparently in 2014 we have reached 3 billion users (Kende, 2014).
[11] The biology, electronics and informatics are converging and interacting in their applications, materials, and in their conceptual approach. Castells (2011) also includes the realm of information technologies, such as genetic engineering and its set of developments and applications.

an archaic tariff system of uncontrollable services; Minitel: a kiosk system that allow[ed] for homogenous tariffs and a transparent sharing of revenues" (Scheer, 1994, pp. 97–8). In 1994, the Minitel could not go beyond the national boundaries due to its "closeness", while the Internet was "open" to better technologies and is today the backbone of a global network that links up most computer networks (computer mediated communication). In turn this affected the adoption of the Internet and its different incarnations and unfolding manifestations, which is today *the universal interactive computer communication medium of the information age* (Kahn, 1999).

Indeed, the phenomena of SM are following the open and sustainable "Internet", namely the Web technology (Kende, 2014). We assume that both Web and SM are user-generated (Tuomi, 2002). In the following sections we explore Web technology and SM technology. In general, the Web is a unique platform of global industry standards applied at the local industry/government level. The Web is composed of several technologies for which no regulations exist; lack of standards for protocols with lack of definition (N. Anderson, 2006). In fact, the Web does not stride along with fundamental technological innovations, but is facilitated by a number of technologies by engineering communities (Kolbitsch & Maurer, 2006).

1.2.1 Web technology, its development and issues

As the name suggests, the web technology is about networks. There are different types of networks (e.g. technical, social, economic); however, the Web network is here understood as an informational network. In this case, the information is connected with links that are related to each other in some order. The World Wide Web (WWW) is the most prominent current example of such a network.[12] The WWW brought public awareness about information networks to the fore, namely *connectivity and sharing that reflect in knowing what has been connected and shared*.

Information networks date back to Vannevar Bush, to whom the Web is *generally* accredited (Bush, 1945), and his Memex. He wrote an imaginative description of how computing and communication technology may revolutionize how people store, exchange, and access information. He claimed that *the creation of information systems represent the associate memory – something our conscious experience of thinking*

[12] The statistics of the WWW usage are as follows: Asia 45.7%, EU 19.2%, Lat. Am./Carib. 10.5%, North Am. 10.2%, Africa 9.8%, Middle East 3.7%, Oceania/Australia 0.9%. (Source: http://www.internetworldstats.com/stats.htm, accessed April 2015)

exhibits – the Memex, a hypothetical prototype, "which functioned *very much like* a Web", digitised versions of all human knowledge connected by associative links, including a range of commercial applications and knowledge-sharing activities that could take place around such a device.[13] Bush not only *foreshadowed the Web itself, but also many of the dominant metaphors, such as the Web as universal encyclopaedia; the Web as giant socio-economic system; the Web as global brain, etc*.

The Web technology was developed during 1989–1991 for people to share information over the Internet (Berners-Lee, Cailliau, Luotonen, Nielsen, & Secret, 1994). It grew from the modest research project in Switzerland-CERN to a vast new medium[14] – Internet. The first Web (1.0) was a combination of static Web pages-documents. The user could *navigate* to those pages via browser (from page to another page) according to the basis of hypertext technology (links). Today the technology links and triggers complex programs that host Web pages, such as a service Ad to shopping basket, Submit my Query, etc. Navigation is advanced with the transaction. In this case, someone performs transactions with the computers that are hosting services. With a description of the direction and structure of the Web we briefly clarify the network where the SM is used.

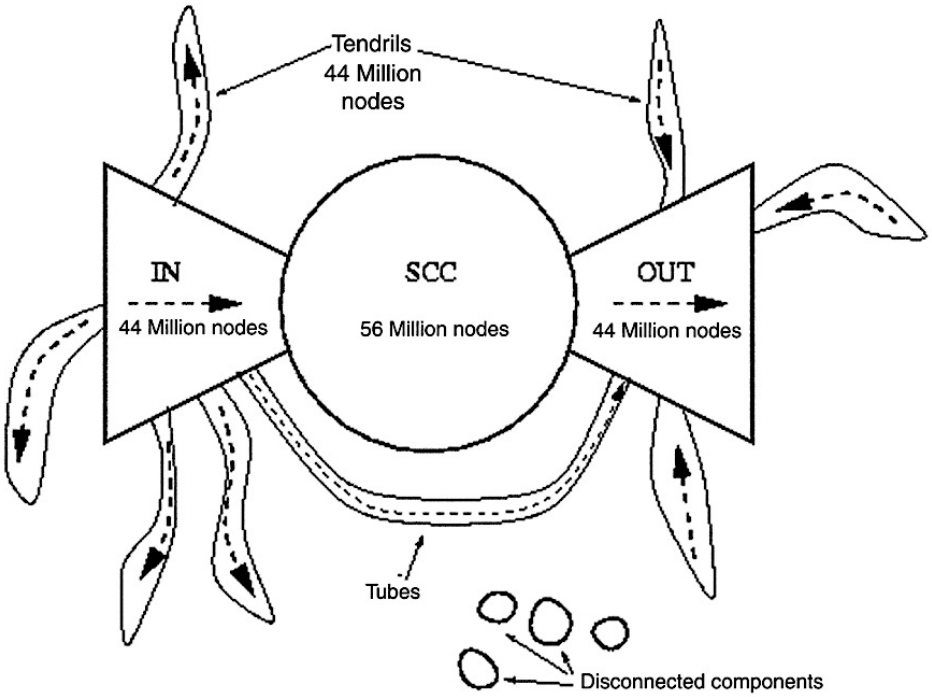
Firstly, the Web is a directed graph. Despite the increasing richness of the Web content as a whole, the *navigational* links present the majority of the Web's structural backbone. In this case, the edges of the network are unsymmetrically connected. For instance, if I am adding a link to a company in my blog post this does not mean the connection is mutual.

The distinction between directed and undirected connections make the difference between the social and information networks (Easley & Kleinberg, 2012). However, the global name-recognition network is structurally more similar to an information network like the Web, than it is to the traditional social network defined by friendship. The directed graph can be strongly connected, if it follows a certain path. This is opposite when certain nodes cannot be traversed via a different network path. The strength of the network path has implications on reachability, especially in regard to the connecting node's properties.

[13] It should be noted that although Bush thought that information would be available to everyone, the Internet is not an ideal for finding all the information that is posted on the Web (cf. Barabasi, 2002).
[14] In Chapter 2 we explicitly address the subject of medium with regard to service innovation.

Secondly, the Web has a bow-tie structure. In Figure 1 we illustrate the properties of nodes in such a structure (Broder et al., 2000).

Figure 1: One of the first illustrations of Internet connectivity



(Source: Broder et al., 2000)

In Figure 1, we see in the middle a giant strongly connected component (SCC) that involves input (IN) and output (OUT) nodes. The IN can reach the SCC, but cannot be reached from it (i.e., nodes that are "upstream" of it). This is the opposite for the OUT. These nodes can be reached from the SCC, but cannot reach it (i.e., nodes that are "downstream" of it). The tendrils are hanging from the IN and OUT nodes. They contain nodes that are reachable from portions of IN, or that can reach portions of OUT, without passage through SCC. For the tendril it is possible to hang off from IN and to be hooked into a tendril leading into OUT, such as by forming a passage from a portion of IN to a portion of OUT without touching the SCC (i.e. tubes). Finally, there are nodes that would not have a link to the SCC regardless of whether we ignore the direction of edges. These nodes belong to none of the previous categories.

The above illustration of the Web helps to explain the *high-level view* and properties of the structure in terms of reachability and how its strongly connected components fit together. The *low-level view* takes the approach of examining the position of the Web

pages and their relation to the design of Web search engines. The emphasis is on the emergence and structure of the Web as phenomena in science from the interdisciplinary view at the pace unable to be followed by most knowledgeable researchers' abilities (Hendler, Shadbolt, Hall, Berners-Lee, & Weitzner, 2008). *The Web of science* is evolving from the bottom up and societies are intrinsically connected to the future of this system.

Indeed, between 2000 and 2009 the navigational and transactional links enabled the emergence of the Web 2.0 (Easley & Kleinberg, 2012). In turn this enabled the emergence of the SM. Although there are notions about the Web 3.0, sometimes also called semantic Web or 3-D environments (e.g. Second Life) (Halford, Pope, & Weal, 2013), there has never been consensus about the Web 2.0.

Three principles of the Web 2.0 technology (O'Reilly, 2007) enabled *the phenomena of SM*: (i) the growth of Web authoring styles for collective creation and maintenance of shared content, (ii) the movement of personal on-line data (e.g. email, photos, videos) from personal computing devices to services offered by (large) companies and *(iii) the growth of linking styles with emphasis on on-line connections between people and documents*. These principles are leveraged with a key technical enabler of the Web 2.0, namely the *Application Programming Interface (API)*. This is a set of functions that allow a Web-based resource to be remotely accessed by an external client. For example, many SM platforms (e.g. Facebook) publish an open, public API that allows external developers (i.e. the wider community, not employed by Facebook) to develop their own interfaces for accessing Facebook content.

Accordingly several SM platforms emerged: *(i) Wikipedia grew rapidly during this period, as people embraced the idea of collectively editing articles to create an open encyclopaedia on the Web; (ii) Gmail and other on-line email services encouraged individuals to let companies like Google host their archives of email; (iii) MySpace and Facebook achieved widespread adoption with a set of features that primarily emphasized the creation of on-line social networks*. Many sites combine one or all three principles – mash-ups of YouTube, Twitter, etc. Although some or many new SM may emerge or replace others in coming years, these principles are applicable to considering the effects of Web technology.

To our knowledge, there is no single event that prompted people to decide to shift from Web 1.0 to Web 2.0 technology. However, while the focus of the Web 1.0 was on delivering the products, the Web 2.0 created *a paradigm shift towards delivering services which could be used and combined with other services in new ways. Another key aspect is the growth of interactivity with end users in new ways, enabling users to drive what is important or of the most value* (cf. Bernal, 2009).

1.2.2 Social media are technologies of collaboration

SM are new technologies of collaboration (D. Hansen, Shneiderman, & Smith, 2010) that are transforming monologue (one-to-one) to dialogue or complex (one-to-many) communication. Consequently, the practices of socio-technical systems are shifting and augmenting social experience and collective intelligence. The SM technologies allow users to collaborate, create, find, share, evaluate and make sense of a mass of information available on-line and off-line. This mix of social action and technological infrastructure allows entirely new ways of collaboration with personalized recommendations based on the prior purchasing habits of thousands of other "similar" people or identification of high-quality "stories" based on real-time voting, sharing, etc. by the crowd, and others, essentially creating a living web of insights, sharing experiences and knowledge. The definition of SM is "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content" (Kaplan & Haenlein, 2010, p. 61). In Table 1 we present the framework for designing the SM with respect to six dimensions which are not necessarily mutually exclusive (D. Hansen et al., 2010).

Table 1: The framework of social media design

Dimension		Description
1	*Size of producer vs. consumer population*	Different scale of consumption and production, sometimes a combination on the same platform.
2	*Pace of interaction*	Asynchronous vs. synchronous, can be blurred on the same platform with implications for control.
3	*Genre of basic elements*	Basic system varies in size and type of digital object with implications for interaction – another way to distinguish SM.
4	*Control of basic elements*	Different levels of restriction, creation, edit, invite, response etc., can be extended to other medium and very important for on-line community building, granularity of control vs. pace of interaction.
5	*Types of connections*	Explicit – created intentionally vs. implicit – referred from on-line behaviour and directed – who is following whom tie vs. undirected – mutually connected, not necessarily reciprocated, therefore implying different relationships.
6	*Retention of content*	Wiki-permanent history vs. instant messaging that is not necessarily recording interactions at all-face-to-face conversation, dependent on the data generation and information processing capabilities leading to long-term cultural memory partnership (e.g. Twitter and Library of Congress); policies depend on products and user settings – user can make information public.

(Source: D. Hansen et al., 2010)

1.2.2.1. Application of social media in medicine

Recently, the SM have been applied in medicine to create a new drug or share DNA, etc. We chose the application of SM in medicine to exemplify the phenomena of social networking, participation, Web 2.0 or apomediation, openness and collaboration in case of a complex (assembled) service (Eysenbach, 2008).

Social networking is central in the Medicine 2.0, it represents explicit modelling of connections between people, formation of complex network relations that in turn enables and facilitates collaborative filtering processes. Users can, via social networks of their friends, colleagues, fellow patients, etc., automatically select relevant peers. This has implications for other users to engage with such social networks according to their preference of managing personal information; something like "Healthbook" where the same users apply the attention and energy of social networking to health. In this case, the users have, not just the power to provide information for further research, but, also, to take the responsibility for their health over time.

Participation is important for consumers and patients, including research. The Web technologies are changing culture and eventually access to information due to empowering and involving patients; leading to "trust your users". For example, SM platforms like Facebook or Patients Like Me, in combination with health record banks, create new levels of participation, unique and precedent opportunities for engagement in health care and research, including connection between formal/informal caregivers. On the other hand, there are plenty of issues in regard to the *privacy* of information – users may not be aware that shared information is permanently attained, which may not be accessible in the future or long-term (e.g. future employees). There is little known in that regard, including consumer awareness and when it comes to young participating users.

The apomediation theory[15] is a way to establish trust worthiness and credibility of information and services (Flanagin & Metzger, 2008). *Firstly*, it involves organizations as intermediaries, i.e. health professionals who give relevant information to patients. *Secondly*, patients access health information by themselves. Typical examples are travellers booking flights or rooms who bypass booking agents. *Thirdly*, this is enabled by the Web 2.0 technology or information-seeking strategy for people who rely less on traditional experts and authorities such as gatekeepers, but instead receive guidance from the apomediation-networked, collaborative filtering processes. The apomediaries help the users navigate through the amount of information offered with the networked SM, providing additional *credibility cues* and *supplying further meta information, including collaborative filtering and recommendations*. Either intermediation or disintermediation is *highly situation-specific* to define the *consumer preferences for* autonomy, self-efficacy and knowledge in the specific area where information or support is pursued. In Table 2 we present the issues of the intermediation and disintermediation environments.

[15] A new socio-technological term to avoid the term Web 2.0 in the health scholarly debate.

Table 2: Issues of the intermediation and disintermediation environments

Dimension	*Intermediation Environment*	*Disintermediation (Apomediation) Environment*
Overarching Issues		
Environment	Managed	Autonomous
Power	Centralized; power held by intermediaries (experts, authorities)	Decentralized; empowerment of information seekers
Dependence	Information seekers dependent on intermediaries (physicians, parents); intermediaries are *necessary*	Information seekers are emancipated from intermediaries as apomediaries (peers, technology) provide *guidance;* apomediaries are *optional*
Nature of Information Consumption	Consumers tend to be passive receivers of information	Consumers are "prosumers" (i.e. co-producers/co-creators of information)
Nature of Interaction	Traditional 1:1 interaction between intermediary and information seeker	Complex individual- and group-based interactions in a networked environment
Information Filtering	"Upstream" filtering with top-down quality assurance mechanisms	"Downstream" filtering with bottom-up quality assurance mechanisms
Learning	More formal; learning through consumption of information	More informal; learning through participation, application, and information production
Cognitive Elaboration	Lower cognitive elaboration required by information receivers	Higher elaboration required by information seekers; higher cognitive load unless assistance through intelligent tools
User	More suitable for and/or desired by pre-adolescents, inexperienced or less information-literate consumers, or patients with acute illness	More suitable for and/or desired by older adolescents and adults, experienced or information-literate consumers, or patients with chronic conditions
Credibility Issues		
Expertise	Based on traditional credentials (e.g. seniority, professional degrees)	Based on first-hand experience or that of peers
Bias	May promote facts over opinion, but opportunity for intermediary to introduce biases	May bestow more credibility to opinions rather than facts
Source	Based on the believability of the source's authority; source credibility is more important than message credibility	Based on believability of apomediaries; message credibility and credibility of apomediaries are more important than source credibility
Message	Based on professional and precise language, comprehensiveness, use of citations, etc.	Based on understandable language, knowing or having experienced issues personally
Hubs	Static (experts)	Dynamic (opinion leaders)
Evaluations	Binary	Spectral

(Source: Flanagin & Metzger, 2008)

Apomediation is not only important for consumers, but also for *scientists and professionals*, namely former intermediaries (e.g. CiteULike, Connotea, or WebCite). However, the open peer-review process exemplifies that researchers are "too busy, and lack sufficient careers incentives, to venture onto a venue as such Nature's website and post public, critical assessment of their peer work" (Nature, 2006). In addition, what works in the entertainment industry (e.g. rating tools for users to rate movies, music, etc.), may not work in the medicine/science. There is a lack of trust, security and visibility of productivity tools, especially in health applications. Apparently, the Facebook, Myspace, etc., work, because *for young people the visibility is important*, which is underlined with the peers' pressure to have a presence and a positive reputation. This is leading to a gap with respect to the older population, including the problem of liability that unfolds in fraud, namely the "purchase" of virtual friends (Slotnik, 2007).

According to the collaboration in medicine, the research aims to improve knowledge translation and put findings into practice (Eysenbach, 2008). In this case, the question of openness (transparency, interoperability, open source and open interfaces) arises, such as "do not lock me in", "my data belongs to me", "open your API".[16] For instance, will Facebook open its data in regard to health? Either way, patients will eventually demand control over their data. Currently, this is the downside, namely the health system lacks a mechanism where people not only feed information, but also get information out again. In other words, a system of *a continuous feedback loop* that does not only absorb information, but also enables people to bring back used information again.

1.2.2.2. User- and professionally- generated content

The phenomenon of user-generated content (UGC) has been available in the past. However, the combination of recent *technological drivers* (e.g. increased broadband availability, software combinations and hardware capacity), *economic drivers* (e.g. increased availability of tools for the creation of UGC), *and social drivers* (e.g. the rise of a younger generation age group with substantial technical knowledge and willingness to engage on-line) *make the UGC nowadays fundamentally different from what was observed in the early 1980s*.

[16] In regard to medicine see personal health application platforms HealthVault and Google Health as examples of API.

In general, the UGC can be defined as anything that amateurs produce – a self-produced (media) content about whose effects on the new media landscape we know very little (Croteau, 2006). Although the vast SM participation is increasing the democratized production of information without filters or fees, this is not necessarily qualitative content (Keen, 2007). The Web 2.0 only delivers trivial observations rather than deep analysis and considered judgement. Allegedly, the experts are replaced with the wisdom of crowds. However, the crowds have been rising what is popular and not what is wise to do or what is reliable information; leading to *mania*.[17] Nevertheless, the SM are useful in certain sectors. For instance, the music industry shows how a lot of artists are famous without the help of typical companies (C. Anderson, 2006).

The SM is driven by the UGC where *participative* and increasingly intelligent Web services empower users to contribute, develop, rate, collaborate and distribute content and customize Web applications (Wunsch-Vincent & Vickery, 2007).[18] However, this definition of the UGC, which is from the OECD, is found unreliable (J. Kim, 2010). It is hard to find pure amateurs' productions, such as nonprofit interest and purely creatively produced content vis-à-vis the professional process. In addition, it is hard to trust the identity of the content producer on the SM landscape. Either way, large SM companies are exploiting the UGC. They invite people to engage actively in any UGC-like media usage (e.g. Facebook, LinkedIn or Twitter). This may at the beginning be the UGC activity per se, but once users' activities turn into a commodity with the economic value or "cybernetic commodity" (Mosco & Dervin, 1989) the notion of the UGC validity disappears. Indeed, the UGC poses serious infringement of copyright law (E. C. Kim, 2007; Hetcher, 2007).

Essentially, the SM systems enable a continuous feedback loop of structured information by the public, which is leveraged by the professionally generated content (PGC) market distribution holders. An example is how a particular channel broadcasts short videos that are selected by the internet users' votes, along with the video

[17] The case of mania is well known from the past, especially in the case of network industries, such as the British railroad, dot.com or even tulips in Holland.

[18] According to the OECD, the UGC needs to fulfil three basic requirements. Firstly, it needs to be published either on a publicly accessible website or on a social networking site accessible to a selected group of people. Secondly, it needs to show a certain amount of creative effort. Finally, it needs to be created outside of professional routines and practices. The first condition excludes the content exchanged in emails or instant messages; the second, mere replications of already existing content (e.g. posting a copy of an existing newspaper article on a personal blog without any modifications or commenting); and the third excludes all content that has been created with a commercial market context in mind.

producers; usually amateurs get paid (Siklos, 2006). In regard to SM, the UGC means a variety of content (Wikipedia and reference Web sites), social networking (e.g. Facebook, Myspace), photo sharing (e.g. Flickr), user rating and review (e.g. Amazon, IMDB), marketplaces (e.g. eBay, craigslist), blogs discussion boards, video games (e.g. World of Warcraft and Second Life)) and on-line video (e.g. YouTube, Ustream, hulu). It is out of scope to name all of them. The list is becoming so long that an "index" of SM exists (D. L. Hansen, Shneiderman, & Smith, 2011).

1.3. Social perspective

The social perspective is inextricably linked to the technological one. Our exploration of it begins with an assessment of the new media environment and its social processes as related to technology. For instance, the technological phenomena of new media have unexpected implications for social practices in cultural and social context. As we move through the section, we delve into who are the users of SM, identifying the consequences of SM use on individuals, firms and society. Finally, we present how social failures are alleviated with the SM.

1.3.1. From technological to social: the dynamics of new media

The field of new media is on the one hand converging due to the networks of networks – the global financial network (Castells, 2010a, 2010b, p. 504) with other media, information sources and services. On the other hand, the SM is a moving research target of social and technological innovation that is spreading and diverging across many disciplines, specialities and perspectives, since the individual person is becoming more and more important on their own, going beyond the informational to the social economy or collective intelligence mediated through cyberspace and leveraged with social capital (Levy, 1997).

Firstly, the definition of media that is based (only) in technological terms is fading away (Livingstone & Lievrouw, 2006). The definition of new media is based on ICT and the associated social context as infrastructures of three components: (1) the artefacts or devices used to communicate (convey) information; (2) the activities and practices in which people engage and communicate or share information; and (3) the social arrangements or organizational forms that develop around those devices and practices. Secondly, the new media evolve in non-linear information processing; considered as social shaping and its consequences – an ensemble (Callon, 1986). Thirdly, the social

shaping is associated with criticism of strong technological determinism and a shift toward a strong social determinism between 1970 and 1980. The view is that "technological, instead of being a sphere separate from social life, is part of what makes society possible – in other words, it is constitutive of society" (MacKenzie & Wajcman, 1999, p. 23).

Although people have always had choices about how technologies are created, understood and used, there are certain technologies that are very embedded and taken for granted in society, e.g. the telephone; the Internet increasingly. These can constrain or limit the range of choices (Zuckerman, 2013). Indeed, *"every system affords a certain range of interpretations, and that range is determined by the discourses that have been inscribed into it"* (Agre, 2004, p. 27, emphasis ours). In other words, if we agree that technologies are social products that embed human relations in their very constitution, we may omit them in the role of actors, along with other kind of actors, when explaining social processes. But this is only a shorthand, "because technological determinism is partly right as a theory of society (technology matters not just physically and biologically, but also to our human relations to each other), its deficiency as a theory of technology impoverishes the political life of our societies" (ibid., p. 5).

In sum, technology, action and social society are inseparable phenomena with reciprocal effect, each influencing other. Therefore, technological determinism contains "a partial truth" (MacKenzie & Wajcman, 1999, p. 3), due to social determinism, which is becoming the dominant research in new media studies (Livingstone & Lievrouw, 2006). *For instance, the social shaping of ICT* is important in the design and implementation of technology that is patterned by a range of "social" and "economic" factors as well as narrowly "technical" considerations. This is a reciprocal co-shaping process in which social practices and technological developments are co-determined (MacKenzie & Wajcman, 1986; Boczkowski, 2004). Indeed, the technology is society made durable (Latour, 1990).

The social shaping of ICT affects the new medium due to recombination and networking. The recombination effect of social shaping takes the path of "continuous hybridization of both existing technologies and innovation in interconnected technical and institutional networks" (Livingstone & Lievrouw, 2006, p. 23). Either is observed as the product of an on-going cycle of *human action* and *available technical and*

cultural resources. Indeed, SM (technologies) are continuously renewed. Although usually created with a particular purpose in mind, they are used in unexpected ways; they are reinvented, reconfigured, sabotaged, adopted, hacked, ignored and so forth usually in the evolutionary cycle (Herring, 2011). This process is a consequence that has roots in changes associated with the ICT. However, the new media are built on an installed base (Star & Bowker, 2002) as forms of *new genres* that continue to branch, recombine and multiply. The networking effect of social shaping is evident in the formation of a network society (e.g. Castells, 1996, 2011).[19]

1.3.1.1. Consequence of ICT on new media technology dynamics in society

The socially shaped ICT affects new media due to ubiquity and interactivity. The *ubiquity* means that new media affects anybody in the society (desirable and inevitable), which is perceived as a public good. This is usually argued with the access to the telephone service that is a basic necessity and therefore governed or regulated on the basis of "universal service" or "universal access" principles or obligations (Leah A. Lievrouw, 2000). With regard to the *interactivity*, the users of new media select and interact with technologies in relation to other user choices of information sources and interaction with other users. Interaction is immediate, responsive and socially present; defined as continuous and bidirectional process enabled by technology and its properties (Rafaeli, 1988).[20]

1.3.1.2. New patterns of mediation

The SM mediate the process of social shaping of ICT. However, the important part in developments is to define *what captures the diversity of new (media) activities*. The "*people" term* captures the individuality and collectivity of new media activities, since they are natural about their abilities and interests. Therefore, SM is a resource that provides people with opportunities to cultivate their tools that allow them to act. Indeed, the communication becomes redefined as coordinated action that achieves understanding or shares meaning (Rogers & Kincaid, 1981). In this case, the

[19] "[T]he point-to-point network has become … the archetypal form of contemporary social and technical organization … [it] denotes a broad, multiplex interconnection in which many points or nodes (persons, groups, machines, collections of information, organisations) are embedded." (Castells, 2011, p. 24)

[20] Based on three principal levels: (1) two-way (non-interactive) communication, (2) reactive (or quasi-interactive) communication, and (3) fully interactive communication. Two-way communication is present as soon as a message flows bilaterally. Reactive settings require that later messages refer to (or cohere with) the earlier ones. *Full interactivity* (responsiveness) differs from reaction in the incorporation of reference to the content, nature, form, or just the presence of the earlier reference. Indeed, the SM enable a two-way communication, eventually full interactivity that is *one of the fundamental characteristics in service or innovation (See Chapter 2)*.

information is an organized, expressed and intangible representation – a product of the communication process – intrinsically interlinked and interdependent (Leah A. Lievrouw, 2001), while the mediation enables, supports or facilitates communication action and representation.

1.3.2. Social media considered by media research and social processes

The SM are new media with particular social processes classified according to theories of media research and social processes (Kaplan & Haenlein, 2010). The media research unfolds the evidence with regard to social presence and media richness. Namely, the higher the social presence the larger the social influence. *Firstly*, the type of contact established is dependent on acoustic, visual, or physical properties of information transaction. *Secondly*, the established contact is affected with the communication partners (between the sender and receiver). *Finally*, the communication can be intimate and immediate. The intimate communication is achieved with interpersonal communication (higher face-to-face). The immediate communication can be asynchronous (email) or synchronous (on-line chat), which unfolds in the amount of information transmitted in a given interval (Daft & Lengel, 1986). Therefore, the higher the richness of the medium and the degree of social presence the medium allows, the richer the amount of information transmitted.

The social processes unfold the evidence with regard to self-presentation and self-disclosure (Goffman, 1959). The concept of self-presentation proposes that any type of social interaction people have is the desire to control the impressions that other people form of them. *Firstly*, the objective of influencing others is to gain rewards. For instance, making a good impression on your future in-laws. *Secondly*, humans are driven by the wish to create an image that is consistent with one's personal identity. For instance, posting of particular content on SM. Self-presentation is usually achieved through self-disclosure. This is conscious or unconscious disclosure of personal information (e.g. thoughts, likes, dislikes) coherent with the image one would like to have. This is a critical step in the development of close relationships (e.g. during dating). However, it can occur between complete strangers. One example is speaking to a stranger on a boat. The degree of a required self-disclosure and the type of self-presentation in SM is defined by what the medium allows (Kaplan & Haenlein, 2010).

1.3.2.1. Fundamental social media: blogs, micro-blogs and social networks

The SM enable the engagement in different types of interactions limited to the technological and social capability of operation. *Social processes are achieved with particular SM classified into collaborative projects, blogs, content communities, social networking sites, virtual games worlds, and virtual social worlds* (Kaplan & Haenlein, 2010). The socio-technical systems enabled companies to interact in different ways; however, we now touch upon the most important development, namely blogging and social networking.

Blogs are personal journals on the Web that give a voice to people that they did not have before the Web. Consequently people can share information and derive business intelligence, including innovation (Chau & Xu, 2012; Droge, Stanko, & Pollitte, 2010). On the other hand, the blogging has a major flaw, because it is subject to "ideas" that could have errors and false truths. Consequently, its reliability is questioned. Micro-blogs (i.e. Twitter) are short 140 character-long blogs with a stream of information that can include (hash) tags and are an established category within the general group of SM. Twitter is considered to be public by default. This means "[a] user can set their privacy preferences such that their updates are available only to the user's followers," otherwise information is not publicly available (Naaman, Boase, & Lai, 2010, p. 2). In regard to the credibility of information, the recency of tweets impacts source credibility, which is mediated with cognitive elaboration (Westerman, Spence, & Van Der Heide, 2014).

Social networking is a major underpinning of the SM (N. B. Ellison & Boyd, 2013). The technical affordances that define social networking have become increasingly fluid and it is increasingly challenging to investigate the rapidly moving phenomena and understand people's practices in the system they are manipulating – enacted shift. The social networking unfolds the context, where "the desire to communicate and share content is a primary driver of SNS use" (ibid., p. 159) due to primary features of profiles, connection lists and traversing. Accordingly, Ellision et al. (2013) improve the definition. "A social network site is a networked communication platform in which participants: 1) have uniquely identifiable profiles that consist of user-supplied content, content provided by other users, and/or system-level data; 2) can publicly articulate connections that can be viewed and traversed by others; and 3) can consume, produce, and/or interact with streams of user-generated content provided by their connections on the site." (ibid., p. 158)

1.3.2.2. Social media in public, private, and in-house solutions

The evolution of social networking shifted its salient features of socio-technical systems' negative and positive consequences on organizations where the SM is used (Leonardi, Huysman, & Steinfield, 2013). For instance, organizations adopt SM internally or externally. With regard to *external communication*, the emphasis is on publicly available platforms, e.g. workers in organizations communicate with external parties (customers, users, vendors, the public at large). With regard to *internal communication*, companies adopt private and in-house platforms that look, feel, and function as SM. Therefore, SM are leveraged in public, private and in-house developed solutions.

Several publicly available SM were adopted in organizations, before the popular SM even considered business pages. For instance, the active bloggers at Microsoft, or users of the Facebook at IBM who at work learn about new colleagues – people sense making. At the beginning issues were with proprietary information leakage, hierarchical problems (e.g. managers become friends with employees). Indeed, companies mostly adopt the SM private solutions due to privacy concerns that unfold the open-source or software as service availabilities to develop in-house solutions that are privately controlled, but open to the external environment. For instance, early Wikis (on companies' intranets) improved working processes, including collaboration and knowledge re-use, but without the significant impact on creation of new business opportunities. However, the active internal blogging communities that were hosted on intranets of large companies (e.g. IBM, Microsoft) led to a number of social and informational benefits for working force and in-house solutions.

The hardware and software companies usually build the in-house solutions. Two examples of prototypes that stand out are Beehive at IBM and the Watercooler system at HP. They have been used to inform the internal production system and future commercial products, or otherwise support clients' needs. The Beehive mostly encompasses features that can be found on Facebook, but is available only to IBM employees. This system is improving strong and weak ties (Granovetter, 1973), including increasing content sharing with the more distant colleagues. Findings indicate the formation of new and stronger weak-ties relationships within a company (DiMicco et al., 2008; Steinfield, DiMicco, Ellison, & Lampe, 2009) with a positive impact on social capital, such as an increased access to new people and expertise, including the

perception of belonging to a larger community. With regard the Watercooler, the idea was to bring together feeds (e.g. novelty, popularity, author, topic, enabled used-filter posts) from separate SM systems that were proliferating in the company (Brzozowski, 2009). The system enhanced employees' access to new people and expertise outside their local units. Taken together, these prototypes have a short life span, since they are either discontinued or their SM features are incorporated to other companies' products.

1.3.3. Perceiving social media user patterns through technology

The native users of SM are Generation X (1961–1981) and Generation Y (1981 onwards). On the one hand, they lack an important emotional event such as the economic depression of 1929–1940 (Alch, 2000). On the other hand, they have experienced long periods of economic prosperity and a quick advancement in direct communication technologies, social networking and globalization (cf. Fleming & Waguespack, 2007). Indeed, a need to interact with others is a key reason for users of SM (Palfrey & Gasser, 2008). There is a general agreement about their frequent use, but not about their activities (Bolton, Parasuraman, Aksoy, et al., 2013).

1.3.3.1. Positive and negative consequences on individuals

The positive and negative outcomes on individuals are reviewed by Bolton et al. (2013). For instance, the outcome of SM use is the formation and maintenance of social capital. In this case, Facebook can boost young people's social capital because their identities are shaped by what they share about themselves and in turn what others share and say about them. In addition, SM have psychological and emotional wellbeing effects such as strengthening family bonds, and nurturing other supportive social relationships that enhance self-esteem. The use of SM can be effective in healthcare too. Health-related information is communicated with the users of SM, because younger generations prefer messages about social consequences over multiple experiences in contrast to older generations that are more influenced by physical consequences, regardless of the number of their experiences.

If users of SM depend on technology for communication, entertainment and emotion regulation, this raises questions about future long-term mental health; including negative effects on social capital (Bolton, Parasuraman, Aksoy, et al., 2013). For instance, too much information or too sensitive personal information can be disclosed when seeking social approval. This is prominent for adolescents and students who

spend more time on SM where they can disclose more information and distort intimate relationships.

The need for popularity is a strong factor of information disclosure on Facebook (N. Ellison, Steinfield, & Lampe, 2007). Although SM users are aware about the potentially dangerous effects of participating in social networking, they have little control over the access to their information on social networks (Hundley & Shyles, 2010). In addition, individuals lose firm- and social-level privacy. At the firm-level, firms may use SM to get information in regard to recruiting. At the social-level governments may endorse public safety laws. Internet addiction is another negative side of SM use (Espinoza & Juvonen, 2011). This leads to (even) more intense use, but worsens pre-existing problems of psychosocially unhealthy individuals who may not realize the long-term costs of SM use (Sheldon, Abad, & Hinsch, 2011).

SM users are more likely to engage in risky behaviour than non-users (Fogel & Nehmad, 2009). For example, on-line community participation leads to riskier financial decisions, because SM users mistakenly believe that, if things go wrong, they will get help from the community, even if it consists of relative strangers (Zhu, Dholakia, Chen, & Algesheimer, 2012).

1.3.3.2. Positive and negative consequences for firms

Bolton et al. (2013) go further and find that SM is a potential source for market intelligence. For instance, companies (e.g. Apple, Whole Foods, etc.) are monitoring social networking sites and blogs to collect information with regard to marketing their offerings. In this case, SM strengthen the customer relationship by encouraging the customers to engage with brands and interact with each other or by fostering on-line brand or user communities (Van Doorn et al., 2010, Goldenberg, Han, Lehmann, & Hong, 2009). This may unfold stronger brand equity and an increase in customer lifetime value with a larger effect than traditional advertising (Trusov, Bucklin, & Pauwels, 2009). The ubiquitous use of SM motivates firms to engage, build relationships and co-create value with the users of SM. In this case, the firms acquire significant rewards (Peres, Shachar, & Lovett, 2011). For instance, after users join the community then customers increase purchases on-line by 37% and off-line by 9% (Manchanda, Packard, & Pattabhiramaiah, 2012).

The use of SM has implications for how firms hire, manage and motivate employees (Bolton et al., 2013). This is significant in service industries e.g. hospitals (Hawn, 2009) where certain amount of SM users make up the workforce (Solnet & Hood, 2008). This is also the case internationally where the working demographic is increasingly becoming "gray" (Baum, 2010). It is challenging to effectively manage the users of SM as workers and their interactions with co-workers and customers due to their different capacity in comparison to older generations (Solnet & Kralj, 2011). Indeed, firms take different approaches to screen employees' behaviour. However, this is an invasion of employees' privacy with negative effects on their productivity, health and morale (Sánchez Abril et al., 2012). This can lead to implications for selection bias (Brown & Vaughn, 2011) or discrimination (Dwyer, 2011), following discovery of sensitive information e.g. sexual orientation, etc. There are several strategies to approach using SM at work (e.g. Piskorski, 2011).

1.3.3.3. Positive and negative consequences for society

SM is important for society from a number of perspectives, including political, economic, social and healthcare. For instance, Facebook, YouTube, and Twitter have been useful to disseminate information about healthcare to communities at large (Vance et al., 2009). The negative consequences are in negative emotions (e.g. anger, envy, hatred and jealousy), which impact the off-line and on-line behaviour (Bolton, Parasuraman, Aksoy, et al., 2013).

Appropriate legal protection may be necessary for public protection when SM are abused. This has sociological effects that may be leading to changes in social norms and behaviour at the social levels of civic and political engagement, privacy, and public safety (Bolton, Parasuraman, Hoefnagels, et al., 2013). More importantly, if regulations do not regulate widespread monitoring of employees' personas, then this will become a norm (Spinelli, 2010). Legislation is not keeping up with technological on-line advances. In this case, people will censor information on the on-line community by themselves, which affects SM contribution – becoming less free (Sánchez Abril et al., 2012) and leading to the ethical consequences (Hundley & Shyles, 2010). Essentially, governments deploy different SM strategies to comprehend the SM at the society level (Mergel, 2010).

1.3.4. Viewing social media use without technology

The conceptualization of SM should be flexible with no ties to particular technologies, but rather to social interaction. However, the functionalities of SM affect how the users interact, coordinate, cooperate, form relationship networks, curate and share information (Sundararajan, Provost, Oestreicher-Singer, & Aral, 2013). Such building blocks on which (norms of interaction and) social processes are built enable dynamic social processes that govern how SM affect the outcomes of individuals, and shape the impact on society by innovation with unseen interactions.

1.3.4.1. Unseen interactions and social failures

There are interactions that do not occur, but would make people better off if they did. *"[T]here are many interactions in the off-line world that we would like to undertake but cannot. These misunderstanding interactions represent unmet social needs, or social failures. In some cases, these social failures relate to inability to meet new people – … "meet" failures. In others' cases, they pertain to the inability to share existing relationships – … "friend" failures. These failures lie in the heart of why people are attracted to [SM]"* (Piskorski, 2014, p. 2)

Social failures arise because of the interaction cost between interacting parties that generate benefits for each other. As long as the costs are beneficial the interaction will be sustained – mutually beneficial. On the other hand, if the interaction costs exceed the benefits from the interaction, then the interaction will not take place and a social failure will occur. There are number of different types of interaction costs and their amount in relationships vary due to different activities. These costs usually arise in combination while only one can become important when preventing an interaction from occurring.

1.3.4.2. Social failures and existing theories

Social failures are related to market failures, including the social exchange as summarized by Coleman (1990) and extended by Molm (1997). They assume that people pose resources that they trade for resources they need. Apparently, not all exchanges that take place are mutually beneficial (Marsden, 1983). This is synonymous with social failure. Although the transaction/interaction costs may have basic similarities (economic rents), they are missing social underpinnings, which is the gap Piskorski (2014) fills, namely providing a uniform theory of how these restrictions arise. Specifically, researchers argue that these restrictions arise when the people

involved have not previously engaged with each other, are demographically different from each other, or perceive the gains from trade to be distributed unequally.

The concept of social failures implicitly reinforces the argument of many social network theories that people who will occupy a particular network structure will be at an advantage over those who do not (Ingram & Roberts, 2000; Powel, White, Koput, and Owen-Smith, 2005; Uzzi, 1997). Indeed, if we agree with these theories, then the disadvantaged people cannot easily replicate the network structure of the advantaged ones (Safford, 2008; Schrank & Whitford, 2013). In this case, anyone would have the same relationship structure; and the benefit of possessing it could disappear. Nevertheless, social failures limit people's ability to engage in mutually beneficial relationships, and thus stop people from replicating the most beneficial structures. This allows people in advantageous network structures to keep the benefits of being in these structures.

1.3.4.3. Social solution

The social failures are alleviated with the social solution (Piskorski, 2014). *Two considerations are important when building the social functionalities*. *First*, the functionality should reduce both the economic and social reasons for interactions costs. *Second*, the "derivative cost" should be considered. For instance, while social functionalities may reduce certain costs, they may also introduce new interaction costs that did not exist beforehand.

The concept of social solutions bears many similarities to economic solutions that alleviate market failures. In the same way that organizations can solve certain economic failures, organizations such as LinkedIn or Facebook can alleviate certain social failures. However, there is an important theoretical difference between the market and social concepts that relate to the ability to compensate third-party individuals for derivative failures (Piskorski, 2014). An effective solution to market failures generates monetary benefits. As a consequence, an effective solution may always make two people better off without someone worse off. In contrast, an effective social solution to social failures generates social benefits, which gives rise to better social relationships that cannot be easily transferred to others. Therefore, if the third parties are integrated there is an option that they will not be fully compensated. As a consequence, a solution

to a social failure may sometimes make two people better off while making someone else worse off.

The social solutions have strategic trade-offs between them, because people vary in regard to the interaction costs they experience. The social solution may include different combinations and variations to reduce different interaction costs. In general, this is how SM differ. For instance, one social solution will be delivered with a certain combination, another with a different one. Indeed, one social solution can reduce more interaction costs than another, and so on. However, this rule does not apply if there exist powerful strategic trade-offs that are associated with the social solutions. The interaction costs with relation to SM are further addressed in the next section (see "Social media interaction costs").

1.3.4.4. Social strategy

Typically, companies engage with SM in two ways. *Firstly*, they broadcast information based on the number of followers or likes that they gain on SM. Usually, they establish their own corporate Facebook or Twitter profile and hope that customers will like or follow, and eventually post information about their goods, products or services.[21] Companies gain users rather arbitrarily; mostly with broadcasting of useful (marketing) information, like sales or promotions, etc. In this case, companies compete on the basis of number of followers/likes. However, there are little to no results in terms of how much this competition relates to their profits. At best, companies improve their measurement of tracking customers' motivations to use SM, and their investments for engaging with the marketer's brands on SM, for example (Hoffman & Fodor, 2010).

Secondly, companies offer customers solutions to connect to each other with different types of interaction and service innovations, and by this increase the profitability of the company. A typical example could be the eBay's Group Gifts app to buy gifts for friends. This application generates three types of immediate benefits for eBay: profitability, strengthening of people's friendship through gifts, and retention of customers who return and buy other products. Worth noting is the fact that, eBay achieved this without extra customer acquisition costs. Piskorski (2014) describes the first way as a digital strategy, while the second is a social strategy. *The hypothesis is that (well-designed) social strategies "are likely to get more engagement than digital strategies because the former leverage what people naturally do on [SM] – interact with others in ways they would find hard to do in the off-line world or on other [SM]" (Piskorski, 2014, p. 141).*

[21] As of 2014, Facebook is leading with approx. 413MIO likes, Coca-Cola is second and has approx. 80MIO likes, while the third place goes to YouTube which has approximately 78MIO likes. (Source: www.insidefacebook.com, accessed October, 2014)

1.4. Economic perspective

This section is divided into three parts. In the first part we explore the influence of economy on SM. Here we see that information and network economies are leveraged with today's technological progress. In the second part, we look at the actual merits of these economies. We see that due to the ubiquitous availability of technology the value of unseen interactions emerged. On the one hand, such interactions are empowering business across different sectors. On the other hand, they are creating a gap between the workforce and innovation measurements. We conclude with the current research in SM economy, especially with the results of SM use in organizations and companies, including costs of SM interactions.

1.4.1. General view of the digital economy

SM are mainly functioning in a digital economy characterized with information networks, with positive and negative consequences. The positive consequences are found in the increase of volume, variety and quality caused by technological progress, and the decrease in cost of many contributions of this technological progress. The negative consequences are evident in ever-bigger differences between people in regard to wealth, income, and mobility, to name the most pertinent caused by ICT. Indeed, the progress of ICT is progressing rapidly toward the computation of routine labour. It should be noted that the routines are limited in terms of explaining human behaviour (Nelson & Winter, 1982; Hodgson, 2003, Becker, 2001).[22] Apparently this is due to lack of individual-level explanation (cf. Winter, 1991; Simon, 1985).

If we agree that modern human capacity emerged with the crucial innovation of the invention of language, then the "language … is fundamental to the thought process itself. It involves categorizing and naming objects and sensations in the outer and inner worlds and making associations between resulting mental symbols. It is, in effect, impossible for us to conceive of thought (as we are familiar with it) in the absence of language, and it is the ability to form mental symbols that is the fount of our creativity, for only once we create such symbols can we recombine them and ask such questions as

[22] Although "routines are like genes in that they store information. But their longevity and their mechanisms of replication are very different from those of genes. They make imperfect copies of themselves, compared with the high fidelity of the reproduction of segments of DNA. Socio-economic selection is not principally from generation to generation but also within the life of socio-economic units. Furthermore, the environment of socio-economic selection is often changing rapidly, compared with the long and often more stable epochs in which most selection in nature takes place. The use of the gene analogy does not give us licence to treat a routine in all or most respects like a gene" (Nelson and Winter, 1982, p. 366).

'What if … ?'" (Tattersall, 2008, p. 289). The possibility of language characteristics can be used and changed in relation to the component costs. Marschak (1965) expressed the belief that language and communication systems are the "essential stuff of economics". Needless to say, the SM are involved in today's "economic" discourse (see the "Social perspective" section earlier in this chapter on p. 24). However, in the next sections we explain the main forces in today's digital economy.

1.4.1.1. Information economy

Language enables the complexity of the information economy (Arrow, 1962). *Firstly, information is indivisible in use*. In ordinary circumstances the same information is not bought twice. In addition, "how-to information" about production is dependent on the scale of production (i.e. it pays a business planning large-scale operations to buy better information than a small firm). In the aftermath, the information creates the economies of scale, eventually a departure from what is expected from the competitive economy. It seems that the more information-intensive an economy is as a whole, the greater the likelihood that this is a significant departure. *Secondly, information is inappropriable;* the possessor does not lose information when it is transmitted. In general, the cost of the transmission is lower than cost of initial production, and the information has the characteristics of a public good (not excludable[23] and not-rival[24]). Consequently, the IPR cannot give absolute security of benefits. As a combination of these circumstances, the investment in uncertain activities, such as R&D, are less than optimal from a social point of view.

If someone exchanges the economy of the market system for the organizational economy – exchange of information (Simon, 1991) – then the market is "the largest and most effective information system in existence" (Machlup, 1979, p. 113). This is also the case when both public and private sectors are combined; organizations are treated as technology. However, *the market system with information elements is not an efficient allocation of resources for invention*. Although the problem of invention/R&D was justified by public subsidies (Arrow, 1962), there are several flaws in this thinking (mainly supply-based), because there is no way the public has the capabilities to utilize the produced information (Lamberton, 1999). *For instance, there are difficulties in defining an item of information and differentiating it from other items; information*

[23] The costs of excluding an individual from consumption are prohibitively high.
[24] The marginal costs of providing it to an additional person are zero.

purchases were often made largely in ignorance of their value; some generators of information had the advantages of special knowledge and skills; information items in use are interdependent, and so on.

1.4.1.2. Network economy

The economy of networks involves information that unfolds three fundamental technological categories (David, 1992). *Firstly*, the employment and production of facilities have significant invisibilities in their capacity. Indeed, over some range of operations there are increasing returns (decreasing unit costs). *Secondly*, the benefits available to individual users of the services provided by these systems are to an important degree dependent on the extent to which other users have access (network), implying the existence of "externalities" on the demand side of the market. *Finally*, technological (economic) performance of the network involves interconnectedness with a certain amount of compatibility (interoperability) among systems' components, either *ex-ante* design through the adoption of certain standards or *ex-post* provision of "hubs" connected to other isolated systems.

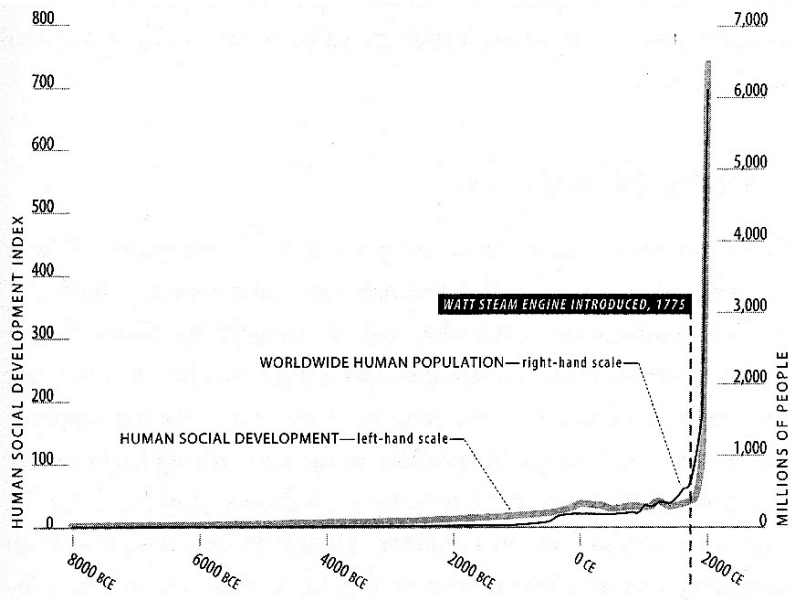
The network economy follows the rules of network effects, switching costs, etc. (e.g. Shapiro & Varian, 1999). For instance, the typical network industry unfolds the market demand as an upward slope (due to demand externalities) and the market supply as a downward slope (due to indivisibilities and supply externalities), with the consequence that their point of interaction defines the "threshold" for the economic viability. Indeed, there is no equilibrium production or consumption that can be attained by the operation of unregulated, competitive market processes. However, information network economies can be overloaded with information – negative externalities that are leading to the identification of anonymous economic agents.

1.4.1.3. Technological progress

As we will see in Chapter 2, the world's economies are majorly service economies. The division between services on the one hand and agriculture, the extraction of raw materials, the production of goods and manufacturing on the other is well explained (A. G. Fisher, 1939; C. Clark, 1940; Fourastié & Lutz, 1954); however, the rise of service economies is increasing due to interactivity powered by technological progress (e.g. Roach, 1989; see the "Technological perspective" section earlier in this chapter). In this case we are facing technological evolution (Arthur, 2009), and in Figure 2 we illustrate

the profound evolution of human history due to technological progress, which SM is part of.

Figure 2: The industrial revolution bent the curve of human history



(Source: Brynjolfsson & McAfee, 2014)

As can be seen from the above figure, the technological progress of ICT, which is the enabler of SM, is leveraging an enormous amount of potential human workforce in the digital economy.

1.4.2. Invisible value of the digital economy

The emerging digital economy indicates promising growth of countries' GDP (Banfi et al., 2014). The notion of such economy is based on unseen exchange and consumption processes that occur in physical world, but are achieved in the (unseen) digital world (Arthur, 2011). Indeed, the digital world follows the information and network economies principles, but this time we are confronted with enormous qualitative global change through the integrated effects of SM. For instance, the physical processes of work are done via market-based services that mimic certain parts of SM. Indeed, the economy is re-creating itself, but this time the processes are concurrent, parallel and ubiquitous with implications for self-regulating and self-organising systems. On the one hand, certain routine labour is disappearing and computational skills and knowledge are dominating. On the other hand, the labour force is missing the competences to comprehend the needs of such an economy (Brynjolfsson & McAfee, 2012).

Needless to say, the Internet, or network-of-networks, is one of the crucial global forces behind the SM. The more the network is "open", the more chances it has for sustainability and usefulness for the user, governments and businesses (Kende, 2014). Consequently, the spread of ICT access enables the economy to evolve across different sectors (e.g. retail, transport and logistics, financial services, manufacturing and agriculture, education, healthcare, and broadcasting and media), including those that have emerged as a consequence of the technology. However, due to the spread in the economy the segmentation of the sectors is increasingly difficult.

The key principal features of the digital economy (Organization for Economic Co-operation and Development, 2014a) are 1) *mobility* with respect to (i) the intangibles, (ii) users, and (iii) business functions, as a consequence of the decreased need for local personnel to perform certain functions as well as the flexibility in many cases to choose the location of servers and other resources; 2) *reliance* on data, including in particular the use of "big data"; 3) *network effects*, understood with reference to user participation, integration and synergies; 4) *use of multi-sided business models* with the possibility of two-sided markets in different jurisdictions; 5) (tendency) *monopoly or oligopoly* in certain business models relying heavily on network effects, 6) *volatility* due to low barriers to entry and rapidly evolving technology.

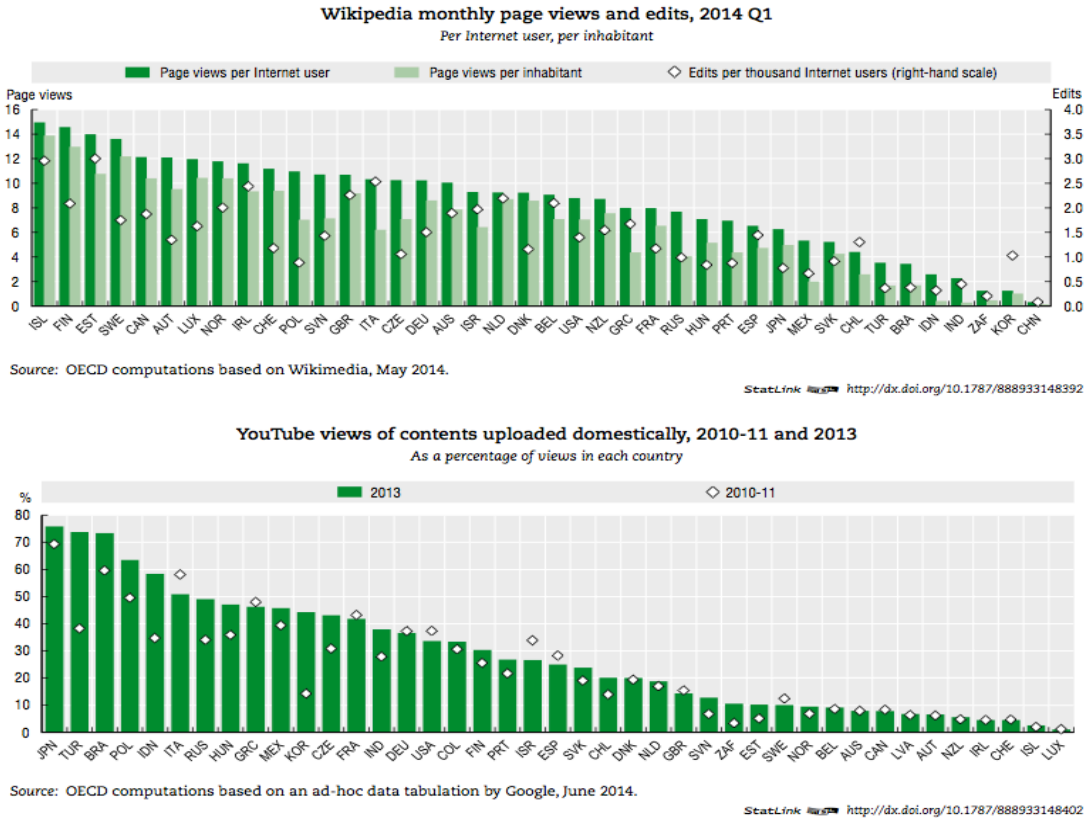
1.4.2.1. Empowerment of society by social media

The digital economy is empowering the society in different ways (Universität Siegen, 2010). In general, the ICT amplifies trends in the economy. For instance, it enforces the volatility and speed of change (yo-yo movements on the stock market and a crowd behaviour of ever-faster selling and buying on such markets). Indeed, the virtuality and immateriality of economic processes is reinforced. Without the ICTs no financial derivatives (packing, selling and securitization of loans, credit default swaps, etc.) would have been possible to the extent they are used now. Furthermore, the ICT enables the software for all financial trade and product innovations, including automatic selling and buying, and so on.

Needless to say, ICT is the enabler of SM activities. "Over 2012–13, on average, 60% of OECD Internet users participated in social networks, while less than 30% sent filled forms to public administrations and only 20% sold products online." (Organization for Economic Co-operation and Development, 2014b, p. 78) Although different SM exist,

people have very similar online interests. “Google, Facebook, YouTube are the top 3 visited sites in OECD. Wikipedia ranks 6th or 7th in most countries.” (Organization for Economic Co-operation and Development, 2014b, p. 92) However, the creation of information on Wikipedia is not equal to the level of information consumption. SM are usually the second most used technology in the economy, after the search engine. However, in Figure 3 we illustrate the diffusion of SM use across borders in the OECD economies.

Figure 3: Wikipedia and YouTube views/edits



(Source: Organization for Economic Co-operation and Development, 2014b)

The use of SM emerged mainly due to the phenomena of online social networks moving away from the “social networking fatigue” syndrome – observed as *homophily* principle[25] that leads to the effect of echo chamber and blind spots in SM (De Choudhury, Sundaram, John, Seligmann, & Kelliher, 2010). However, recently this has been alleviated with the exploring and leveraging of different contexts (Scoble, Israel, & Benioff, 2014) of individual and local experiences/embodied knowledge. In this case,

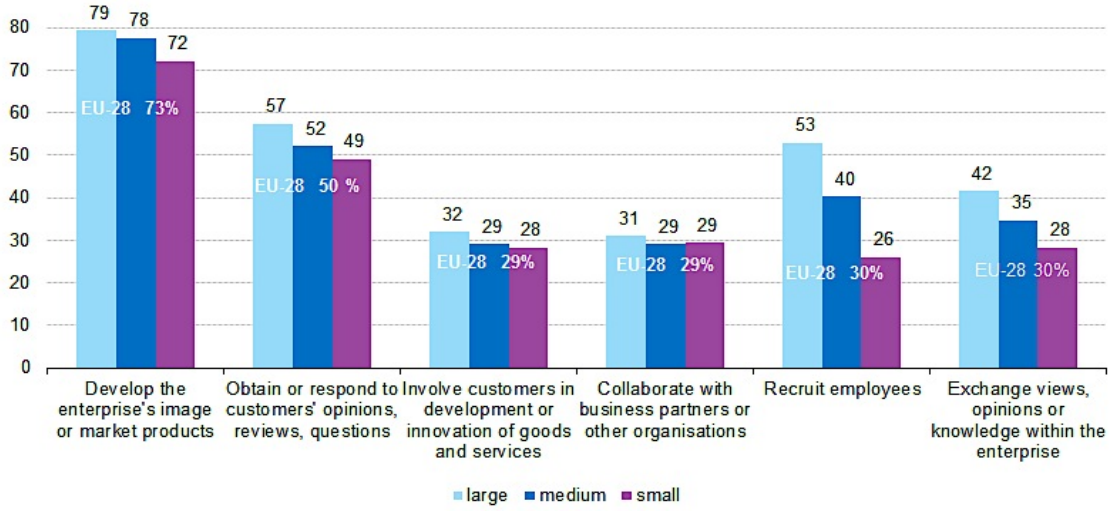
[25] People have the tendency to associate and bond with similar things and people – so there is a limitation on information they receive.

the digital economy is reallocating wealth and income. For instance, the users of SM can quickly replicate valuable ideas, insights and innovations at very low cost. Consequently, the demand of a previously important type of labour is disappearing.

1.4.2.2. Empowerment of business by social media

Firms are not ignoring the activities of SM in the economy (Giannakouris & Smihily, 2013). For instance, some 30% of EU enterprises used SM in 2013, with almost three out of four of these businesses (73%) using the SM to build their image and market products. Social networks were enterprises' favourite form of SM. Half of the EU enterprises that used SM, especially enterprises in the accommodation sector, reported using them to obtain customers' opinions or reviews or to answer their questions. The size of the enterprise was not so important in determining whether the firm used SM to attract customers. In Figure 4 we present the use of SM according to enterprise size class and its purpose of use in EU-28 in 2013.

Figure 4: Enterprises using social media, by purpose of use and size class

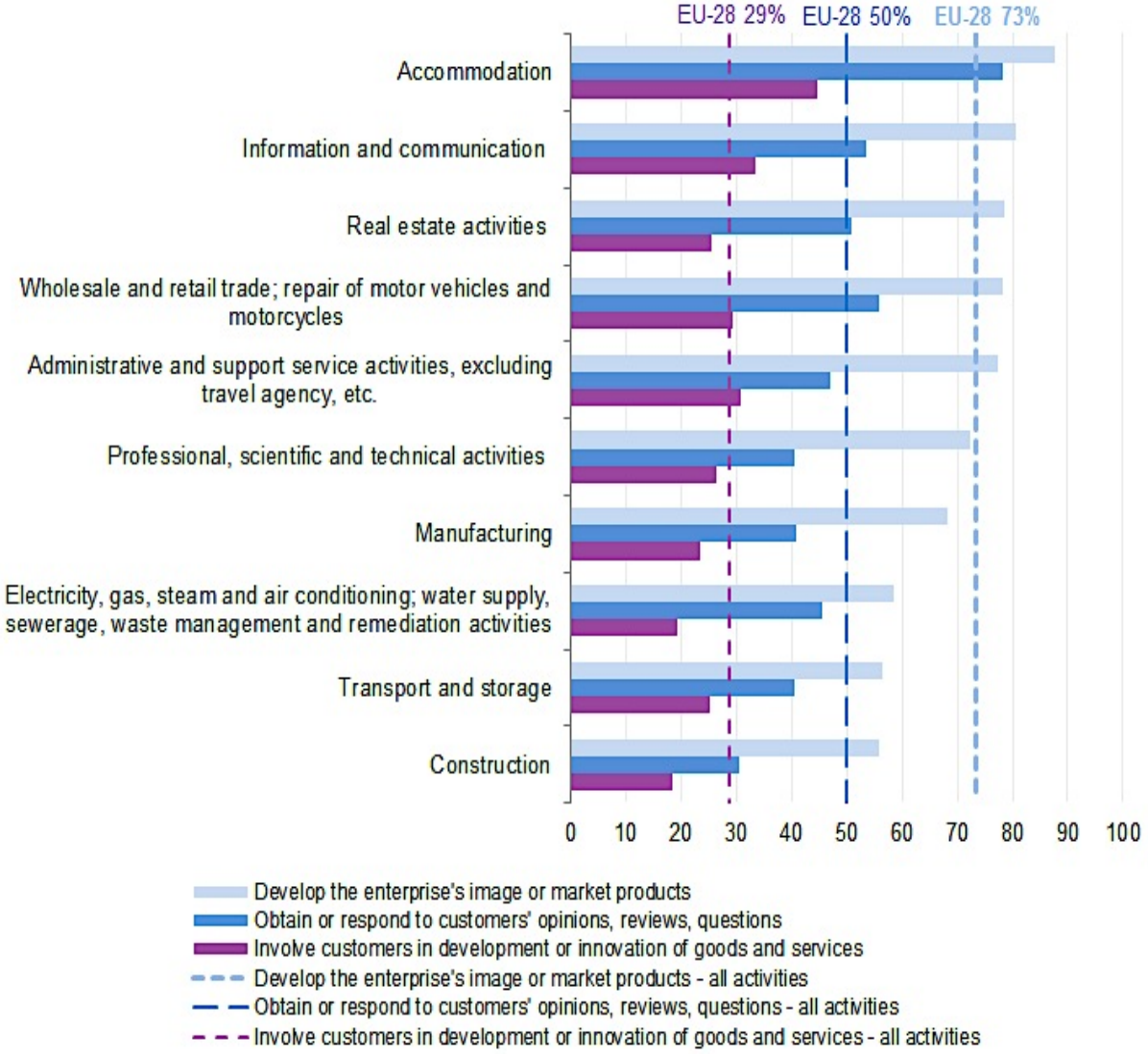


(Source: Giannakouris & Smihily, 2013)

Indeed, in the EU economy, firms also use the SM for collaboration with partners and other organizations. In addition, they exchange knowledge within the enterprise and involve customers in development or innovation of goods and services. In Figure 5 we present the purpose of SM use with regard to the economic activity in economy (EU-28 in 2013). Although most of the companies are using SM to develop their image/market products, especially in accommodation economic activity, it should be noted that

interaction with customers in development or innovation is not neglected across other economic activities.

Figure 5: Enterprises using social media, by purpose of use and economic activity



(Source: Giannakouris & Smihily, 2013)

1.4.2.3. Value of social media and user-based innovation indicators

How much value does SM contribute to the GDP of a country? Due to the digital economy we see that today we know less about the sources of value than we did in the past.[26] For instance, the use of Internet per user per year is estimated to be 2600 USD (Brynjolfsson & Oh, 2012), which is not part of the GDP. Indeed, the cost considerations plus management practices are dependent on incomplete, inappropriate and outdated statistics collected by national and international agencies (Lamberton,

[26] We are not alone. See, for example, Brynjolfsson & McAfee (2014).

2006). However, uncertainty is the complement of knowledge, and information activities constitute the major claim on resources. This has implications for the limitation of information and each individual's handling capabilities in social interdependence. One implication of this will be seen in the distortion of today's understanding of R&D definition, especially in the view of services and how organizations that are responsible for measuring such activities on a national level do not comprehend this easily even today. See Chapter 2, namely 2.1.4. Search for service innovation indicators and definition of R&D on p. 63.

Recently, SM is considered for monitoring and evaluating user-driven innovation (Still, Isomursu, Koskela-Huotari, & Huhtamäki, 2011) to counteract the problems of innovation measurement indicators (e.g. Milbergs, 2007; NESTA, 2008; Organization for Economic Co-operation and Development, 2007). The argument is that "SM tools and platforms can provide faster and more flexible tools for monitoring the diffusion and impact of user driven innovation in both micro- and macro-levels" (Still et al., 2011, p. 5). In Figure 6 we illustrate the paradigm shift with regard to the development of innovation indicators in the digital economy.

Figure 6: Paradigm shift in innovation indicators

	Analogue	Digital
Innovation	Companies R&D, closed innovation, Few Innovation actors New technology Tangibles Waterfall-model of innovation Patents, scientific publications, number of new products	Networks of companies, (eco)systems Open innovation, co-creation Many innovation actors, including users New technology, new services, new processes, new products Intangibles Agile innovation, lean start-ups Time-to-market, scalability
Data	Surveys, company reporting Lack of data Structured data Statistically representative samples	Digital footprints of innovation actors Information overload Unstructured, unorganized, incomplete data Biased data
Indicators	Lagging behind Manual processes Table format, some graphs	Possibilities for real-time Economical computer-powered processes, though challenging Interactive, data-driven visualizations, network visualizations, timelines, geospatial representations, (eco)systemic level

(Source: Still et al., 2011)

1.4.3. Social media in the economy

Next we unfold current research about SM at different levels, and more specific results in terms of SM interactions inside organizations and companies, including the costs of SM interactions.

1.4.3.1. Social media research scope

The research in SM has recently dramatically increased (van Osch & Coursaris, 2014). The focus is on the activities of the SM landscape conceptualized as "an intersection of activities that producers and users of [SM] can undertake and the level of analysis at which these activities can be investigated" (Aral et al., 2013, p. 4). The activities are categorized into four broad areas that describe how producers and consumers create and use SM, while the level of analysis characterizes the research perspectives. Consequently, we reveal the scope of SM research and it seems that there are more questions, or even unidentified questions, than answers, apparently due to the complexity of the SM landscape. In Table 3 we summarize the important findings.

Table 3: Social media research summarized

The level of analysis	The activities: *i) Design/features*	*ii) Strategy/tactics*	*iii) Management/organization*	*iv) Measurement/value*
i) Consumers/society	- firms create word-of-mouth peer influence and social contagion with viral features into their products/marketing campaigns, - firms optimize the strength of network effects by adjusting the embedded SM features together with the network seeding and pricing strategies, - users' status, similarity and desire affect their UGC production and network relationship, - community feedback on UG product design creates lower variety, self-satisfaction, product usage and valuations.	- every business person should have a personal SM strategy, - the individuals' LinkedIn's weak ties generate job leads, while strong ties have an important role in generating job interviews and offers, - increasing firms' internal SM deployments enhance knowledge and intra-firm collaboration, - SM within firms introduce new norms of employee behaviour and create new career opportunities and challenges; people who are connected to diverse networks, especially, may have more intense social communications and are less likely to be laid off.	- although different literature in sociology provide an excellent review, it seems the research field is still quite undeveloped in terms of business studies.	- SM in many cases affect consumer choices, - SM reviews may decline with more online reviews for a product; the diagnosticity of reviews declines, leading to worse decisions, - Relationship in SM social network affects decision quality; formation of weak ties initially hurts decision quality and only leads to better decision when the user has enough experience in the community, - SM intervention helps by identifying internal expertise; interventions improved (via different mechanisms) billable hours and job security, essentially the outcomes of decisions (direct effect) and changes the decisions instigate (strategic effect) can be improved, - The dissemination of SM encourages consumers to consider actions they have never considered before, however, they as well note that a narrow focus on decision quality in search of evidence for SM impact may constrain the researchers abilities' to capture the deepest effects.
ii) Platforms/intermediaries	- the platform design can affect the development of the SM landscape, namely incentives for third party developers. Firstly, incentives can inspire developers to produce more engaging applications by restricting how features are used. Secondly, the feature-related policies affect how users affect and use applications, and their success, - the feedback and interaction of UG design communities have a counteractive/counterproductive effect on the variety and quality of users' designs. Different implications: design choices, design constraints on third-party developers and end-user innovation.	- SM platforms are fighting for profitability and growth, faced with a wide range of strategic considerations of platform economics or two-sided markets, - SM add value by providing the infrastructure to tie together two or more groups of affiliated customers, such as the users and advertisers in case of Facebook.	- In regard to platforms there is little scholarly attention currently devoted to these topics that leaves out high impact research.	- SM track ratings as their critical measure; this is how the SM usually earn revenues in proportion to the number of impressions they serve. However, to our knowledge there are no such measures suggested.
iii) Firms/industries	- firms optimize the level of SM functionality built into their software, including communication (e.g. chat, avatar, interaction), collaboration and co-creation (e.g. wikis, content editing, tagging), peer referral functions, and reputation building. Embedding extra SM features enable different types of engagement, and interaction can enable firms to optimize the strength of network effects at the utility level (e.g. complementarities between firms' strategies), - SM features affect consumers' utility by influencing the degree to which adoption by consumers' peers affect their own utility for the product. The local network effects are important (e.g. one's direct peers rather than adoption by consumers at large).	- SM enable a two-way communication between many, which is a shift in the environment that requires development of a new strategy and tactics, - SM is a strategic benefit for on-line reviews for the firm, - SM can be used for marketing, namely in promotion and building customer loyalty, - SM use different tactics for content production on Facebook, - when firms actively manage their Facebook profiles by regular posts, this induces more UGC, but due to the employees, not from clients, especially in terms of untargeted postings, - market seeding word-of-mouth of social networking may result in a consumer backlash, if users find out that others got products for free, leading to different factors in social networks of homophily, social influence, and structural equivalence.	- Firms often initiate and moderate SM with certain functional departments (e.g. marketing, public relations, or are often outsourced). This is a problem, because customers do not distinguish between the functional divisions of a company, but frequently expect that the firm will respond, regardless of the service problem, and offer advice in regard to the product improvements, for example. Currently, there is lack of understanding of how to best organize and manage SM with respect to companies, including industry-specific best practice, which currently follow consulting.	- In general, the relative impact of firm- and user-created SM on firms' profits indicates that the latter have a bigger effect, - customer visit frequency and customer profitability as participation in a firm's SM activities lead to increases in both of these important outcomes for a firm, - on-line reviews and chatter, respectively, are leading indicators of stock-market performance, - market returns of technology can be predicted with the SM, including the predictive power of SM. These may be better than those provided by search metrics, - as social interactions expand, firms may produce higher- or lower- quality products due to the nature of impact, namely when SM expend awareness and change beliefs firms produce higher (lower) quality products, - the inclusion of SM measures (activity, valence, ratings as explanatory variables of firms' profits, sales, etc.) may be a challenge due to correlated observables, endogenous network formation, and simultaneity, - the consumer engagement impact with the SM (e.g. posting on Facebook, sharing a video on YouTube, etc.) on consumer and firm outcomes leads to the assumptions that the exogeneity of this engagement may not be warranted, - increasingly popular is the propensity score to counteract the SM participation due to confounding effects caused by the non-random application of the treatment.

(Source: Aral et al., 2013)

1.4.3.2. Social media in organizations and companies

In the previous section we have reviewed general research about SM. In this section we focus on the use of SM in organizations and companies. In this case, the use of SM is compared between digital and physical "offices" where social interactions occur (Leonardi et al., 2013). The individual functions inside the company/organization are contextualized as the Enterprise SM (ESM): "Web-based platforms that allow workers to (1) communicate messages with specific coworkers or broadcast messages to everyone in the organization; (2) explicitly indicate or implicitly reveal particular coworkers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited and sorted by anyone else in the organization at any time of their choosing." (Leonardi et al., 2013, p. 2)

Although the first three activities above are to some extent already available in organizations, the ESM is unique because these activities are now centralized and recorded, stored, etc. for manipulation in the future. Indeed, the SM are important in the organizational communication process, because they afford the behaviours, which are difficult/impossible to achieve in combination before the SM becomes available in the workplace – altering socialization, knowledge sharing and the power process in organizations (cf. Treem & Leonardi, 2012).

The uniqueness is that these activities are codified and available (as knowledge) for one's co-worker to view at any time in the future. The codification of knowledge is the subject of research in the economics of technology (e.g. Cowan, David, & Foray, 2000; Cowan & Foray, 1997). "All of these aspects of knowledge – its creation, its storage, its retrieval, its treatment as property, its role in the functioning of societies and organization – can be (and have been) analysed with the tools of economics. Knowledge has a price and a cost of production; there are markets for knowledge, with their supply and demand curves, and marginal rates of substitution between one form of knowledge and another." (Simon, 1999, p. 24)

In the digital economy, organizations can cooperate internally and externally outside-in/inside-out as a direct pathway to an organization's memory. Before immense adoption of SM, scholars have found little support of ICT in knowledge codification at the individual level, but rather the epistemic communities/open virtual communities

benefit more (Steinmueller, 2000). However, the individuals have an option to learn in this process or at least participate in different degrees of knowledge codification e.g. know-what, know-why, know-how, and know-who (B. Johnson, Lorenz, & Lundvall, 2002; Lundvall & Johnson, 1994). With regard to SM, the knowledge dimension is extended further with the instrumental and meta-knowledge (Leonardi et al., 2013).

However, codification is not what is important to support science in terms of economics, because it does not make any difference whether knowledge is codified or not due to its complementarity. *For instance, knowledge development involves learning skills that are tacit and usually based on social interactions that give rise to more complex motivations for behaviours. Indeed, knowledge is processed by a variety of social interactions (knowledge conversion and transfer) between embodied (tacit) and personified (codified) knowledge* (Ikujiro Nonaka, 1994; Ikujirō Nonaka & Takeuchi, 1995; M. Polanyi, 1983). For example, Nonaka sequenced different modes of knowledge conversion into a learning spiral (i.e. socialization, externalization, combination, and internalization) that cannot exist individually. Hence knowledge is not (just) a composition of different information parts, because different individuals can compose different knowledge out of the same information parts. In other words, the debate about the role of tacit knowledge in economies is about what kind of analytical models are most adequate when it comes to understand the economic dynamics.

Apparently, the SM have abilities to fulfil some of the main requirements of tacit knowledge sharing (Panahi, Watson, & Partridge, 2012). For instance, the social interaction, experience sharing, observation (watching, and interactive listening), informal relationship or networking and mutual (swift) trust via SM are supposed to be positively associated with the sharing of tacit knowledge. Indeed, the scholars in management and organization studies have not yet begin to explore the use of SM. However, the literature was reviewed (Leonardi et al., 2013) and in Table 4 we list three categories of descriptions with regard to SM advantages and disadvantages within the organizations and companies.

Table 4: Description of social media advantages and disadvantages in organizations

Processes		Leaky pipe	Echo chamber	Social lubricant
Social capital	*Advantages*	Easy to ''keep up'' with what others are doing without significant social investment. Broad knowledge helps build bridges across non-redundant groups.	Immediate feedback from similar others strengthens existing communities. Helps to establish common ground that makes interaction and sense of belonging easier.	Insights into what others are doing and who they know help create conversational fodder that makes it easy to initiate new connections and maintain established connections.
	Disadvantages	Awareness that others see what/whom you know could stop you from contributing so as not to undermine brokerage position. Potential loss of power from making private rolodexes public.	Self-reinforcing groups may balkanize and splinter into non-redundant communities. Groupthink could arise from exposure only to similar others.	Peripheral awareness of others may create the illusion that a real social connection exists when it does not. Too much social information can disrupt work and distract from work-related communication.
Boundary work	*Advantages*	Ability to cross more knowledge boundaries due to visibility into what people are doing in other groups, departments, or locations. Ability to see more connections between people and forge alliances.	Understanding of people in different parts of the organization, but doing similar tasks, can increase sense of relationships and belonging. Promote similarity and accessibility in global teams, across cultures.	Ease of communication creates a low stakes environment to reach out to people not within same social group. Blurring boundaries between private and work communication showcase personal similarities that can be touch points for work communication.
	Disadvantages	More generic communication due to awareness that people outside a trusted or known community are watching. Loss of proprietary information in a particular group.	Strengthen boundaries between groups making communication, interaction and identification more difficult. Create a "speaker's corner" in which people only from one side of boundary interact and listen to each other.	Context collapse makes it difficult to know which "self" to present in what situation. Highlights differences in communication style across cultures, which can make people more reticent to reach out across boundaries.
Attention allocation	*Advantages*	Individuals begin to focus on information, knowledge, and communication from others with whom they would not normally talk.	Because of the public nature of communication to a known community, people provide more accurate and honest information. Information from trusted others increases attention to ideas communicated by others.	Due to threaded and temporally ordered nature of conversation, people can focus their attention in ways that allows them to enter conversations more easily at meaningful times.
	Disadvantages	Many information inputs means cognitive overload and individuals allocate attention only to specific areas of the organization, or discontinue use of ESM altogether due to overload.	Individuals may believe that information they are attending to is representative of entire organization. Construction of sub-optimal attention allocation strategies.	People interject in conversations not intended for them. Too many social-related signals can scatter one's attention and increases absentmindedness.
Social analytics	*Advantages*	Because communication is visible and available, managers can use these digital traces to understand the organization's informal information economy. Create strategic opportunities for connecting people who are not yet connected.	Better understand who are the various communities within the organization, even if those communities are not tied to formal organizations (e.g. departments or divisions).	Recommendations of connections provide excuses for people to get to know one another. Recommendations for documents that one might read can provide conversation-starter material with documents' creators.
	Disadvantages	Increased ability for surveillance and possibility of control. Knowledge that management is watching may compel people to refrain from communicating on the platform.	Incorrect understanding of what communities are or who key players in them might be, because analytics do not sample communication that occurs offline.	Encourages strategic self-presentation or offline interactions to avoid being traced, tracked, and quantified, which reduces the likelihood that people will use the tool to make new connections.

(Source: Leonardi et al., 2013, pp. 8–10)

1.4.3.3. Social media interaction costs

Immense SM interactions present different costs on the basis of use with respect to economic and social causes (Piskorski, 2014). The (1) *breadth costs* limit the number of relevant individuals between whom interaction is possible. Indeed when costs reach the limit then social failure occurs. However, with regard to the economic causes, an example is when people live far away from each other or do not have overlapping time schedules. Therefore, if these people meet, then costs will be incurred due to travelling and meeting, for example. The high costs of doing so prevent the mutually beneficial interaction from occurring. With regard to the social causes, an example is when people with different cultures' social values have different values. So, when one person engages in such interaction then certain interaction costs arise, which may impact on the occurrence of interactions.

The (2) *display costs* occur in unilateral or one-sided interactions. For instance, one actor would like to convey personal information to another and generate value for both, but reaches the limit of doing so. Consequently the actor engages in costly actions to display relevant information to others. When these costs exceed the expected value of the interaction, than the interaction will not take place or social failure will occur. With regard to economic causes, the questions can be observed with economies of scale, namely the costs incurred when people want to display information to more than one person at one time. Consequently certain people will be informed, while certain will not. With regard to the social causes, an example is when the whole scale of the population is considered and then some of them may not understand information about some social cause as intended. If this outweighs the costs of doing so, then it will not take place and it will be restricted to display information, for example.

The (3) *search costs* (one-way interactions) occur when people search and would like to obtain personal information from others to generate value for both, but face the limit of doing so. People engage in costly search efforts to overcome such costs. For example, when the costs exceed the expected value then the interaction will not occur and social failure will emerge. With regard to economic causes, the search for information in a certain size of population may incur certain costs, again described in terms of economies of scale in regard to the population where the information is sought after. With regard to the social causes, if the same population of the party is considered then it may be awkward to approach every person and obtain certain information, due to social

value. Consequently social failures may emerge (see 1.3.4. Viewing social media use without technology" on p. 33).

The (4) *communication costs* (two-way interactions) occur when both actors want to convey personal information to each other and generate value, but find it difficult to do so. The economic causes are based on a misalignment of interests. When one actor identifies in advance that communication will not be successful due to time-constraints, then it chooses not to advance. With regard to social causes, the subject of culture is related. For example it is inappropriate in the culture of discourse to suggest such an alignment of interests. Therefore, to avoid such misalignment, one actor may not participate in communication at all, and the social failures of achieving a certain goal of the communication partner may emerge (see 1.3.4. Viewing social media use without technology" on p. 33).

1.5. Conclusion

In this chapter we have observed through different perspectives how societies are gaining power through the application of SM. We can assume that SM are part of innovation through the interactions of the physical and digital economies. With regard to the technology we see how the new Web technology enables such interactions and empowers SM users with new, yet unseen ways of collaboration. However, in the third part of this chapter, we saw how the technological features of SM pose enormous numbers of "social questions". Specifically we see how SM are combining social processes with different perception of SM users with and without technology involvement. In this case we find that SM may affect organizations, companies, and societies negatively or positively. However, in the last, fourth part, we find that the user of SM is the one who is empowering societies and business due to low cost and access to different information. Accordingly user-based innovation SM indicators are put forward to measure innovation in the economy.

We conclude this chapter with the role of SM in the economy from the perspective of research scope and SM interactions in organizations and companies. Firstly, we find that research is increasingly paying attention to the activities of SM. The focus is on the intersection of activities that producers and users of SM can undertake at the level of analysis where these activities can be investigated. However, it seems that there are more questions than answers. We explore the activities further with the use of SM in

organizations and companies through the digital and physical "offices" where interactions occur. Different advantages, as well as disadvantages, are noted, namely that SM are characterized as leaky pipes, echo chambers, and social lubricants that may lead to particular interaction costs. Taken together SM are unique for organizations since they enable centralization of information and codification of knowledge, because SM allow the behaviours, which were difficult/impossible to achieve before the SM – altering socialization, knowledge sharing and power processes in organizations.

2. THEORIES OF SERVICE INNOVATION AND USER INVOLVEMENT

In this chapter we present a review of service innovation and user involvement theories and literature. This is an important subject of interest to (modern) developed economies, since service and innovation (Gallouj, 2002a; Gallouj & Djellal, 2011; Lusch & Vargo, 2014) present more than 70% of employment and value added, and demand for services is 50% of overall final demand. However, the importance of service innovation has been underestimated for a long time, namely due to issues of ill-definition and mis-measurement of service output in the conceptualization and analysis of innovation in services (Gallouj & Savona, 2009). On the one hand, the manufacturing sector is seen as the producer of technological systems and services that are using produced technologies – innovation. In other words, services own little of their own production. On the other hand, services today present most of the wealth in developed economies, mainly due to the shift of employment from industrial to service (information) economy propelled by today's ICT.[27]

The world has never produced so many innovations in the past as today in the era of ICT. However, in services the emphasis is on knowledge, namely R&D, and innovation is a privileged service (Baumol, 2002). Due to the emerging digital economy (see Chapter 1) we see an opportunity for integration of service innovation. In this case, we link the SM user as part of the employment and value added with today's innovation and leverage the ICT in service innovation. Consequently, the knowledge required for

[27] Technological shifts are occurring continuously and the structural change of technological revolutions can be observed by comparing the *industrial revolution (1st) and the age of information and telecommunication (5th)*, especially its different techno-economic paradigms and innovation principles (cf. Perez, 2002). Technological revolutions are usually strongly related constellations of technical innovations, including an important *all pervasive low-cost input (Perez, 1983), often a source of energy, sometimes a crucial material, plus significant new products and processes and a new infrastructure, which changes the frontier in speed and reliability of transportation and communications while drastically reducing costs*. In the 5th revolution the value is added intangibly, namely via knowledge intensive services as the engines of growth. These can be more effectively dispersed via new tools of ICT.

innovation is organizationally dispersed. In this case the locus of innovation is shifting from inside companies to their outside relations, namely networks, alliances, collaborations, etc. Innovation is increasingly co-created or co-produced with partners or stakeholders, such as suppliers, users, universities, etc., characterized in different ways as open, networked, distributed, interactive and democratic (Tuomi, 2002; Powell, Koput, & Smith-Doerr, 1996; Chesbrough, 2003; von Hippel, 2005a). Indeed, companies *need* good links with external knowledge, including the ability to achieve prompt and effective exploitation.

This chapter is further disposed as follows. Firstly, we introduce the service economy, namely the definition of a service and certain clarifications with regard to the service output. Secondly, we observe the literature of service innovation from different perspectives. The integrative perspective is gaining ground. However, it is also imperative to review the assimilation and differentiation perspectives, since they help to illustrate the integration perspective with regard to user involvement. User involvement is explained in the third section. Due to the interactive nature of services, users are an imperative part of service innovation output. In this case, we review user-based innovation in services, and its relationships. At end of the chapter we briefly summarize and outline the concept of user-based service innovation (UBSI).

2.1. Service innovation economy

It took countries, governments, institutions, and educational, organizational, and innovation scholars several decades to consider that services are mechanisms of innovation. Although it may look like innovation studies seem to receive a fair amount of attention, their prominence is fairly recent (Fagerberg & Verspagen, 2009). For instance, the theory of service innovation has been evolving since the 1970s; "paralleled by increasing policy recognition in the growth and significance of services and in particular how *innovation in services* and *service innovation* is of increasing importance to national and local economies" (Howells, 2010, p. 68).

The exploitation of external knowledge is challenged by new technological developments or the manufacturing and service sectors of production. But the debate about economic performance (growth and productivity) seems to be mainly about the innovation in manufacturing, such as the manufacturing of tangible properties of goods, in comparison to service innovation scepticism (cf. Delaunay & Gadrey, 1992). In this

thesis, a service-based paradigm of innovation[28] is observed in relation to the ICT paradigm (Freeman & Soete, 1997). *We are constantly concerned with how economic literature considers the subject of service innovation (process)*[29] *from the perspective of technological changes in ICT.*

The output of services and its constellation in an economy is challenging. Arguably, a service could be as much what emerges from the software sector of an economy (e.g. SM) as the prime promise of a service future. Although the information revolution is in the development surge towards reaching its maturity, it looks as if the role of services and their place in the composition of the economy's output is yet to be of importance. This is exemplified by several economic shifts (e.g. Fagerberg, Martin, & Andersen, 2013). However, the important shift to note is about moving from institutionalized ICT to the effective use of ICT and intangible assets. For example, the "productivity paradox" is well known: "You can see the computer age everywhere but in statistics." (Solow, 1987) This finding was based on investments in ICT or tangible assets to increase productivity. However, today the research is focused on how to make ICT more effective with intangible assets that present the majority of the market value in terms of ICT capital. By the end of this chapter we want to show that services are mechanisms of innovation, since they also leverage intangible assets with ICT.

2.1.1. Definition of a service

The definition of a service in this thesis is based on a "triangle relationship" between a client (user), service provider and medium (Gadrey, 1996). This definition extends the work of Hill (1977) who first separated *the customer and medium in service provision, service as a process and service as an outcome*. For Hill the service is "*a change in the condition of a person, or a good belonging to some economic unit, which is brought about as a result of the activity of some other economic unit, with the prior agreement of the former person or economic unit*" (Hill, 1977, p. 318 emphasis ours).

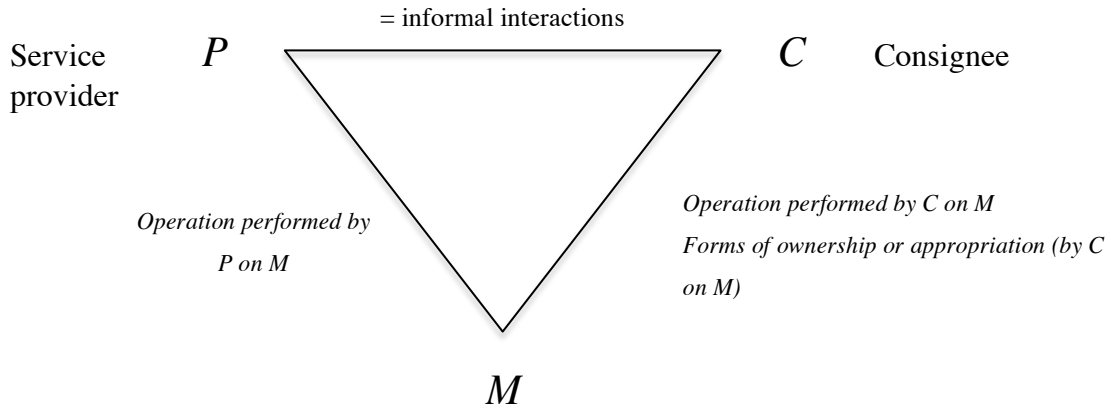
Although the triangle idea is from the interactional order in sociology, namely practitioner, object and owner (Goffman, 1983), it was Gadrey (1996) who introduced

[28] According to Barcet (2010), the concept of service is still a little problematic. However, we adopt Barcet's terminology in order to distinguish between a *service* that produces effects for the client (dimensions that we qualify as "service-based"), a *service* as the result of the actor providing it (the supply dimension) and *services* as activities or organizations.

[29] It should be noted that by far the most influential aspect of growth in services is related to the service production process or the gap in productivity between service and manufacturing activities of production (cf. Howells, 2010).

the service triangle, "the output of which cannot circulate in the economy independently of [a user]" (Gadrey, 2000, p. 376) and the implication for ownership in economic transaction. Gadrey (1996) extended and clarified the work of Hill (1977) with the next diagrammatic representation.

Figure 7: Service triangle



The relationship between the service triangle corners	
P	the service provider (public, private, individual or organization)
C	the customer, client or user (regardless of institutional association: households, individuals, firms, organizations, communities and so on)
M	the service medium as the target or modified reality that is worked upon by the service provider on behalf of the customer

(Source: Gadrey, 1996)

According to Gadrey (1996), the service is defined as a set of processing operations carried out by the service provider on a medium linked in various ways to the customer, but not leading to the production of a good able to circulate economically independently of that medium. The purpose of these processing operations is to transform the medium in many ways.

In the course of processing operations, the actors in the triangle establish particular relationships. These can be various ties between the customer and medium, such as ownership, use or identity that requires a form of ownership critical to appropriation.

These can also be operational links between the service provider and medium, where operations define the medium in terms of customers. However, they can just as well be informal interaction between the service provider and customer.

The medium can have many forms, namely technical goods or systems, codified information, individuals (customers, users) and their physical, intellectual or locational characteristics, and organizations of various technologies, structures, collective competencies and knowledge. The nature of processing operations is limited by the medium used for processing information.

2.1.2. Clarifications of service production of value

Hill (1977, 1999) starts defining a service and a good. *The good:* a tangible or intangible entity that *exists independently* of its producer and its consumer; an entity to which ownership rights, private or public, can be assigned and that can therefore be resold to its owner. *The service:* not an entity, it requires a relationship to exist between the person seeking a service and the service provider, upon request for intervention; this concerns an individual, a good or a material system – an entity that is owned by the person requesting the service. In this case, the output of the entity changes the state according to the modifications or conditions of this entity. No specific ownership rights can be assigned to this output, so there is no possibility that the changed state can be sold independently of the person requesting the service.

According to the service triangle, Gadrey (2000) improves the definition by considering live performance of human capacities that are not as easily maintained as technical capacities. "*Any purchase of services by an economic agent C (whether an individual or organization) would, therefore, be the purchase from organization P of the right to use, generally for a specified period, a technical and human capacity owned or controlled by P in order to produce useful effects on agent C or on goods C owned by agent C or for which he or she is responsible*." (Gadrey, 2000, pp. 382–383, emphasis ours). However, two problems are found.

The first problem is an exclusion of personal services (e.g. domestic employees and home helps), since the so-called "productive" services of wage labour are not included. Usually, such services are formulated by the private contract that circumvents the service-providing organization, etc. *The second problem* is based on the grounds of *the service triangle*, namely the service output, which cannot circulate in the economy

independently of a user (C). To some extent this helps to reduce the first problem, but the problem still persists when the "C is an organization that produces goods and turns to another organization P in order to ask it to take responsibility for that production" (ibid, p. 383). According to the above definition, such services are being purchased.

These two problems clarify *the value of economic service production*, which takes place in the following two examples:

- when an organization P that owns or controls a technical and human capacity (e.g. competencies), sells or offers without a payment (e.g. non-market services) the right to use that capacity and those competencies for a certain period to an economic agent C in order to produce useful effects on agent C or on goods, C, that he or she owns or for which he or she is responsible.
- when a household[30] employs a wage earner to look after its goods or itself (or possibly persons towards whom it has a duty of care: children, parents, etc.).

Accordingly, *three different groups of cases* are described. In some cases, the right to use takes the form of an *intervention*, requested by C, in a medium, M, owned or controlled by C. This brings us back to the service triangle. In other cases, it comes down to the *temporary use of a maintained technical capacity* by C, placed at disposal by P. In a third group of cases, it is a *human "performance"* (accompanied by its technical aids) organized by P and attended by C.

These groups unfold three demand rationales: (1) the assistance or intervention, (2) the provision of technical capacities and (3) the live performance. *In the first*, the user is served or assisted; there is a request for intervention made at a given moment by agent C and conveyed to organization P whose action (human capacities supported to a greater or lesser extent by technical tools) is expected by a way of response. *With the second*, the user avails him- or herself (making a simple personal decision to do so) of a properly functioning technical capacity that P places at the disposal of C under agreed conditions. *In the third*, the "performance" rationale, there is a decision to attend a "human" performance under the conditions set by an organization, P, or negotiated with it.

[30] According to Gadrey (2000), the use of the term denotes an economic function (or status) that, by definition, excludes those situations in which the wage earner is hired (e.g. entrepreneur) for the purpose of public production (market or otherwise).

The activities of rationales overlap; therefore, varying combinations exist, defined according to the next two criteria: (1) the agent C activates the capacities and competencies used (with a request for service or a decision to serve him- or herself), and (2) the nature (technical or human) of capacities with which the users mainly come into contact. In addition, either rationale's activities affect the output of a service product differently. The output of the *assistance or intervention rationale* (rationale 1) is most obvious one. In Hill's words these are "the repairs" or changes in the state of realities subject to intervention. This is critical, because there are several different conventions that can be used to classify and evaluate the changes of state. The output of the *provision of technical capacities rationale* (rationale 2) is often represented with time units that vary in accordance with the mode of use. Duration of a telephone call is a typical example. The output of the *live performance rationale* (rationale 3) and its units are usually pre-packaged sequences of performances. Indeed different sizes of audiences can be considered when evaluating the output of this rationale's activities.

It is not possible to produce services in one country and then export them to another country, which is in general possible with goods (Hill, 1977). This applies to local repair or the third, *live performance rationale*. However, this is not the case with services that are based on technical capacities of telecommunications, television, information and reservation, banking and financial services, electricity distribution, air transport, etc. (Gadrey, 2000), because the provision of a service is dependent on the technical system that can be to a large extent "exported" – guaranteed without the customer proximity and constraint – once the customer is connected to the system. This is even more the case when the connection can be made at the end of the de-concentrated technical networks, such as the Internet[31]. However, apparently there is no definitive and fully acceptable distinction between goods and services, which may likely lead to the evolving *shared understanding* and conventions that could define certain products as goods and vice versa with more or less arbitrary conventions (Gadrey, 2000).

[31] Gadrey (2000) gives attention to the technical networks of cables, radio, telephony, electricity or telephone lines, and water supply systems. In this case, the analogy of these technologies can be summarized as the Internet. For instance, the Internet is possible due to the evolution of telephone, radio and electricity technologies. All essentially transfer information with the help of a medium.

2.1.3. Service challenges

Although the literature in economics and management of services identified specific and undeniable characteristics as an attempt to appreciate and understand the value of services in the view of productivity, quality and performance (Djellal & Gallouj, 2009) these challenges remain: *i) uncertainty, ii) temporal effects, iii) non-stockability, iv) interaction, v) value systems, vi) productivity and non-productivity, and vii) service measurements*.

i. The uncertain output

Service output is loosely defined due to its intangibility and instability. In other words, the process of providing a service is not necessarily an output defined or visible as a tangible good. In fact, the direct output of a service is a "change of state" (Gadrey, 2000, p. 371). In this case a product is a process, a formula, a receipt, an action or a protocol, seeking organization of boundless space. Therefore, when considering the output of a service we get entangled in several factors, namely identification of the output-unit, and separation of the output from the production used, which is synonymous with the process and innovation, and with service quality.

ii. Temporal effects on output

Services must be defined in time. The concept of computer mediation existed in the past, but the mediation from the past did not offer the characteristics of today's mediation. Although both can be considered a service, there is a way to distinguish the effects over time in relation to the output versus outcome. Indeed, both may have the immediate or mediate effect on the output (Gadrey, 1996). In terms of a hospital stay, the immediate output would mean various procedures carried out during the patient's stay and would have short-term consequences, while the mediate output would be a change in the long-term consequences, such as the condition of the patient after the treatment. In this case we are faced with a challenge of how a service is defined in time and how this affects its productivity and, eventually, performance (cf. Baumol & Bowen, 1966).

iii. Output cannot be stored (e.g. non-stockability and inability to be inventoried)

Services are consumed as they are produced (Hill, 1977). This characteristic helps us to understand the output of a service, namely from the view of the consumer and producer (Djellal et al., 2009). Indeed, the link between the producer and consumer can help to define the output of a service. For instance, "what the consumer considers is consumed" can after all be considered by the producer as "what has been produced for the consumer". Although this view can be helpful to define the output, the consumer and producer views do not always overlap.

iv. Output is interactive

The customer, client or user is important when delivering a service. The input from the user can be in a form of interaction with the provider's technology or its own computing device, namely the case of a new information and communication technology (NICT) – e.g. a device connected to SM where a customer interacts in a network in order to co-produce or co-create a service/value. The interaction results in a definition of service output – involving the customer in interaction can mean the service will always have a different output through adopting the specific needs of a user. This has a fundamental influence on productivity and quality in terms of the interface between the client and service provider (Gadrey & Gallouj, 1998). Indeed, the users of a service can face the positive and negative consequences in the interaction with the organization. Therefore, they can be excluded or included in the interaction totally or to some extent; all the way through to working for themselves, such as with self-service.

v. Output is integrated in systems of value

Service output is subjective, since it depends on several systems or judgments of value. Indeed, a service does not exist independently, like a good with its conserved technical specifications. "*It is a social construction (reference world) that exists in various ways in time (time horizon) and in the material world (degree of materiality or tangibility).*" (Djellal & Gallouj, 2009, p. 36 emphasis ours). This could also be understood as that each service is a case on its own, but this does not help much in regard to the systematic solution. *Gadrey (1996) finds different groups with the main distinction between them as to what degree the output is standardized, stabilized and identifiable: services that mainly involve the physical processing of technical mediums; intellectual services applied to organizationally produced knowledge; services applied to individuals'*

knowledge and capabilities in the actual final consumption; and internal organizational and management services.

vi. Productive and non-productive challenge

The main challenge here is the mis-measurement of service economic performance that is probably caused with or stems from the ill-definition of service output as observed above. Gallouj et al. (2009) remind us about the debate among productive to non-productivity theories. The first debate is about specificities of the service production process, and its productivity gap between services and manufacturing sectors. The second debate is about the nature and consequences of service growth developed in 1960s, namely the rigidity of the "cost disease" concept (Baumol & Bowen, 1966). This concept is associated with the productivity performance of service industries; analogously explained with the performance of a "string quartet". It is argued that no matter how the string quartet plays, if it plays according to the given notes, then not much can be done to improve its performance (cf. Baumol, 1967).

vii. Service measurement challenge

The main challenge here is the complexity of an organization of different dimensions. For instance, Griliches (1992) finds several problems that are related to the measurement of the service output:the nature or content of the transaction (e.g. is the service provided by a physician the procedure itself, the consultation or the results of the cure?); the nature of the user involvement in the definition of the service output, which makes it more difficult to standardize and consequently to price;the quality change that is possibly more difficult to detect in services and to account for in price structures.

The challenges of services are further examined (Howells, 2010). However, we lack the articulation of components in service innovation, including the adequate description and measurement of the associated processes, flows and transactions. This encompasses interactions in the innovation cycle, not just at the front-end, but mainly patterns of co-working during the processes of developing the innovation and its final outcome. In manufacturing and in some services this is not a problem, since the co-production of value is explicit in the tangible properties of a product, or processes or components. However, this is not the case with the intangible interaction of products, whose processes require more detailed articulation and elaboration.

In summary, the above problems unfold the following solutions. Firstly, the services are consumed as they are produced and vice versa, which requires some sort of customer – user – participation or cooperation. This is a mutual process that requires a balance to remain the "live performance" of innovative production. Secondly, the issue of quality changes require an appropriate price choice, especially with regard to the productivity issues in service and fast technological pace. Either way, intangibility and interactivity are becoming increasingly important in manufacturing. Therefore, sounder conceptualization of (service) product definition is argued (Gallouj & Savona, 2009) that will add to the theory of innovation and reconcile service and innovation in modern economies (cf. Djellal & Gallouj, 2008).

2.1.4. Search for service innovation indicators and definition of R&D

The specificities of services are complex, especially due to the intangibility and interactivity of technological and non-technological innovations. This manifests in the institutional surveys that are trying to capture the potential innovation indicators; essentially the (existing) surveys are limited to provide us with the truthful answer.

For example, we can observe service innovation indicators from the subordinate and autonomous surveys (Djellal & Gallouj, 1999). The subordinate surveys limit themselves to service definitions and questionnaires intended for manufacturing activities. They are concerned solely with technological innovation. As a result, they give preference to a restrictive concept of innovation. On the other hand, the autonomous surveys focus on service specificities or interactivity and intangibility factors in the search for the account of innovation. Either approach has issues in surveying service innovation activities. The problems are mainly due to service specificities in innovation. For instance, several problems are evident, such as that product is a "fuzzy" process, or services are interactive, the service sector is one of extreme diversity, questions of R&D and inter-sectorial comparison, and so on.

Although there are serious methodological problems, reasonably wide-ranging surveys have been conducted in some countries with relatively satisfactory results. However, the argument is that we should aim at tailor-made questionnaires, since they may be preferable to more general questionnaires covering all service activities. In this case we would seek extreme heterogeneity of the service sector, especially "to construct questionnaires tailored to relatively homogeneous 'sub-groups'" (Djellal & Gallouj,

1999, p. 18). Needless to say this should also follow proper R&D definitions in services, where the emphasis is on social aspects (e.g. design and development of organizational engineering, composite nature of projects, etc.). Such aspects usually escape the definition of technological innovation (Djellal, Francoz, Gallouj, Gallouj, & Jacquin, 2003).

2.2. From adoption of technology towards service innovation synthesis

Recently, the literature of service innovation reviews the marketing and innovation literature as a progression of research in terms of evolution perspectives; chronologically between 1986 and 2010. Namely, service innovation field evolved from a supplement of traditional product innovation to a multidimensional notion of several functions within and outside the company (Carlborg, Kindström, & Kowalkowski, 2014) which unfolds the innovation and performance gap (Djellal & Gallouj, 2010). The *"innovation gap"* indicates that our economies contain hidden innovations not captured by traditional indicators, such as R&D and patents, while the *"performance gap"* indicates an underestimation of the efforts directed towards improving the performance of such economies. In other words, service innovation is a subject of knowledge development that is not necessarily measured with typical innovation indicators, such as R&D and patents. In addition, the output of service innovation performance requires multi-criteria and its dynamic properties, which usually escape the traditional measurements of performance, such as productivity and growth. We acknowledge the assimilation, differentiation, inversion and integration perspective (Gallouj, 2010) as fruitful to address these two gaps with regard to SM.

2.2.1. Assimilation perspective

The assimilation (reductionist, technologist or industrial) perspective argues that novelty is embodied in a technical system (Gallouj, 1994, 1998; Coombs & Miles, 2000). It advocates the manufacturing sector in production of a certain technology. In turn services adopt this technology, so it is the manufacturing that provides the solution, and eventually, innovation. Although this perspective is technology biased, it is still dominant and most successful.

There are several empirical (heterogeneous) studies for dissemination of technologies, but a limited number of theoretical constructs (Barras, 1986; Pavitt, 1984). However, the next three economic and management arguments unfold the success of this

perspective. *Firsly*, the inertia of our analytical tools from the manufacturing economy is subject to a law of decreasing returns in an intangible, knowledge, and social relations economy. *Secondly*, the dramatic disseminations of ICT, and services that are actually intensive users of technology and capital. *Finally*, the increasing complexity of product activities that were usually associated with the processing of a material object. "One would thus go … to more complex activities in which the product is developed, to different degrees, in space and in time, by processing data, knowledge, and relationships." (Gallouj, 2010, p. 990)

Indeed, ICT has a substantive role in service innovation (e.g. Rada, 1986; Hackett, 1990). The mainframe computers and decentralized ICT/networks models are cross-compared with the typical economic variables (e.g. employment, skills, organization of jobs) and the result unfolds two hypotheses (Gallouj, 2010):

(1) The mainframe computers tend to utilize a positive effect on productivity and tradability, but a negative effect on employment and labour skills. This is related to the back office and mainly reduces the costs of service provision by standardizing jobs and operating economies of scale.

(2) The decentralized IT and networks tend to have a positive effect on employment (or certain kinds of jobs), skills, tradability, including possibly on productivity and its quality. The peculiarity is that it may change the interface with the customers or the front office. Indeed, it generates economies of variety and reduces the routine jobs, especially in favour of commercial activities and consultancy.

The ICT can partially *relax the assimilation perspective* with the autonomy and endogenous ICT in different services and relational trajectories of individual or hybrid service firms.

Autonomy: services are in a position to produce their own technical systems. Indeed, some firms have influence on the industrial suppliers who are dependent on them. Therefore, if firms can influence suppliers, then *consumer-dominated innovation trajectory should be introduced*.

Endogenous ICT: services are not only adopters of ICT, but can increasingly play an active role in their production and diffusion. Service is the hybrid between the NICT and organizational engineering – design and development of organizational

arrangements. Not just at the back-, but also (underestimated) at the front-end office, linking the back-end. The result is *a new form of interactivity and construction of new spaces;* especially consideration of the proximity and space (national or international virtual proximity and so forth).

2.2.2. Differentiation perspective

This perspective is based on *the hypothesis of service specificities*, namely their intangibility and interactivity with consequences for the nature of innovation and on its modes of organization (Gallouj, 1994, 1998). On the one hand, the intangibility is difficult to apply to certain services (e.g. transport, catering). On the other hand, *ICT is making services more tangible by defining the process of producing the goods*. Indeed, the intangible and interactivity elements are becoming increasingly important in manufacturing.

The service innovation specificities are addressed deductively and inductively. The inductive approaches emphasize particular forms without the assimilation perspective, while the deductive approaches address the theoretical characteristics of services (e.g. intangibility, interactivity), especially for construction of hypotheses with service specificities.

The intangibility is blurring the process, product and organizational innovations. This is weakening the service output. *Firstly*, a service is not necessarily embodied in technical systems – because this makes services liable to imitation. *Secondly*, the fuzzy service output has problems with evaluating the economic effects of innovation (e.g. employment and effect on sales). *Thirdly*, informational asymmetries are substantial in service transactions. This is even more so with a new service. Indeed, customers can circumvent a service, because it is hard to evaluate the impact of the output and suggest the price of innovation. While these intangibilities are presenting problems in measuring, they are also presenting opportunities in envisaging the existence of their own product and process innovations (cf. formalization innovation).

The interactivity takes the form of nonlinearity advanced in the chain-linked interactive model with open space for innovation (Kline & Rosenberg, 1986). However, these characteristics have certain consequences for the definition and indicators of (service) innovation:

- *Various forms* of ad-hoc or custom-made innovation (cf. Gadrey and Gallouj, 1998).
- *Possibility of collaboration with a client* or the actor of innovation, and the success of the innovation process, which is dependent on the quality of the interaction (e.g. von Hippel, 2005b; Lusch, Vargo, & O'Brien, 2007; Ulwick, 2002; Edvardsson, Gustafsson, Kristensson, Magnusson, & Matthing, 2006).
- *Difficulties in estimating the cost of innovation*. In the case of ad-hoc or custom-made innovation, the innovation process may merge with the production.
- *Problem of the appropriation regime*. If innovation is co-produced or co-created to whom does it belong? This is a problem beyond the question of legal protection, namely the issues of distribution of jointly produced innovation.

The first studies of service specificities have origins in Knowledge Intensive Business Services (KIBS) (e.g. von Hippel, 2005b; Ulwick, 2002; Lusch et al., 2007; Edvardsson et al., 2006), e.g. research, consultancy and engineering business services. As the name suggests, knowledge presents a major challenge in this arena due to its multi facets. For instance, it is not always clear where the boundary is between the continuum of data, information, knowledge, competencies, and capabilities.

In today's knowledge economy firms are seen as processors and producers of knowledge with a particular input and output of knowledge. Several different modes of knowledge processing and productions are considered by theory of KIBS, either within such firms or when such firms produce knowledge for other firms-clients (e.g. Gallouj, 2002a; Di Maria, Grandinetti, & Di Bernardo, 2012; Alvesson, 2004). It should be noted that KIBS studies consider the representation of service specificities the most. Indeed, on the basis of KIBS, theories of knowledge intensive firms or professional service firms in creation of value theories are evolving (Robertson, Scarbrough, & Swan, 2003; Von Nordenflycht, 2010).

However, the "application to all services" is explored with the case of consultancy. Gadrey and Gallouj (1998) substitute the product and process typology with the innovation typology that considers the cognitive nature of KIBS's activities. This is qualitative research, which is favourable in this case. However, it is supported with the quantitative surveys, especially to quantify the qualitative research with numerous autonomous surveys.

Although the innovation specificities in less knowledge intensive services (e.g. transportation, cleaning, elderly care) have been investigated, they usually escape the non-technological studies. The complex services and the whole problem of analysing innovation depend on a good being mixed with other complex products or services, such as tourism (e.g. Caccomo & Solonandrasana, 2001). On the one hand, it involves the linking of complex goods that are defined as temporal sequences of market goods and services (transportation, accommodation, catering, attractions, and visits), while on the other hand, it also involves linking of public goods and services (natural heritage and sites, transportation and signalling infrastructure, tourist offices).

2.2.3. Inversion perspective

This perspective presents a stronger argument than the differentiation perspective (e.g. autonomization) in translating services to innovation (emerging) from the manufacturing sector; the inversion of power between the industrial and service sector. Of course, KIBS also innovate for their clients. Consequently, they have an important role in innovation of the manufacturing sectors and customer service. Their nature is an interactive learning process of knowledge to produce (new) knowledge and a contribution to the innovation in different functions of the firm. The role of services in their customer innovation is considered in two ways, namely: 1) KIBS and their customers' innovation (Gallouj, 2002c; Hertog, 2000) and 2) the interactional model of innovation (Gallouj, 2002b).

1) KIBS and their customers' innovation can be seen as organizations whose information and knowledge are both the principal input and output. *At the theoretical level, it is important to distinguish what concerns the routine processing of knowledge and what concerns innovation*. Several studies emphasize the finding of the externalization of R&D activities, such as the role of intermediary public agencies in the dissemination of scientific and technical information (Djellal, 1995; Bessant & Rush, 1995). These studies are devoted to consultancy in ICT, or analysis of the consultant's role in technology transfer.

It should be noted that *the transfer is not reduced to its linear dimension, and technology is not reduced to its material dimension*. Milles et al. (1995) define *knowledge intensive companies' activities as using, diffusing, and being sources of innovation*. Consequently, ICT improves the connectivity of agents (the number of

connections established within a network) and their receptivity (their liability to absorb information) due to the increased use of knowledge intensive services (Cristiano Antonelli, 1995).

2) *The interactional model of innovation* is linked to the Schumpeterian tradition of innovation, namely assistance of consultants in interactional innovation such as perspectives in improvement of varieties of mechanisms and forms of innovation (Gallouj, 2002b). This model extends entrepreneurial and monopolistic models, or combinations of both, since innovation can also come from the interaction with the external knowledge providers. It fits well with the conceptualization of KIBS and their clients' innovation process. In addition, it can also be used for application of intra-firm service relations or alliances, collaboration and cooperation irrespective of the sector. Furthermore, it marks a break with the concept of knowledge as information, and as public good. It alters the economic characteristics of knowledge by attributing a significant role of tacit knowledge, and the nature of relationship between the tacit and codified knowledge; emphasizing the cumulative and specific nature of knowledge.

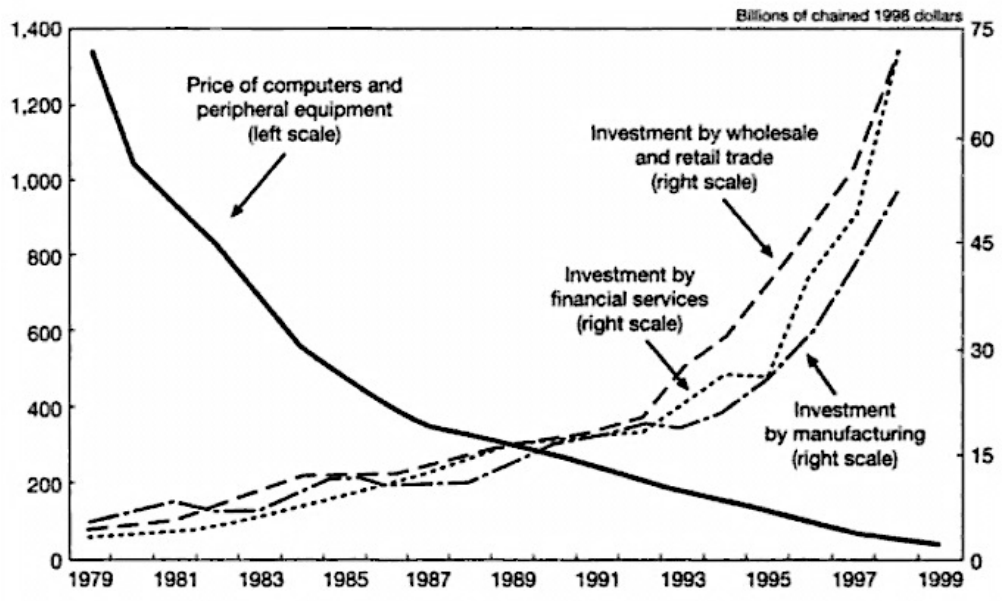
Tacit (embodied) knowledge is considered, on the one hand, as rival good, while on the other hand, as an excludable good (i.e. easily appropriated). Therefore, such knowledge is a genuine private good. Whether codified or not, knowledge depends on the context and introduced irreversibility of the learning process. Thus knowledge can be stored, accumulated and capitalized. Indeed, the competitive advantage of external KIBS providers over internal specialists are less in the reduction of transaction costs, than in quantitative and qualitative differences and complementarities relating to knowledge – external economies of cognitive scope (cf. Nooteboom, 1992)

Essentially, this model accounts for another stage in the evolution from the Schumpeterian entrepreneur to the monopolistic innovation. However, this stage is based on the KIBS or the burst of the tertiary economy, which Schumpeter could not envisage. *It should be noted that in such an economy knowledge intensive services are the second knowledge infrastructure that supplements and competes with the traditional infrastructure, mainly compromising public education and research services* (Bilderbeek & den Hertog, 1997).

2.2.4. Integration perspective

This perspective allows the service innovation gap to be filled, because it applies to both goods and services simultaneously, including numerous innovations in industrial services offered as complements to goods (e.g. Gallouj, 2010). The general idea of this perspective is that "the value of numerous goods is supplied by services and innovation in services" (Gallouj, 2010, p. 996). Indeed, the blurring of the sectorial boundaries is converging goods and services in different ways (e.g. Barcet, Bonamy, Mayère, & du Plan, 1987; Barcet & Bonamy, 1999; Vandermerwe & Rada, 1989; Neely, 2008). Some suggest that the NICT (cf. social big data) as technical systems shared by manufacturing and services contribute to this blurring (Broussolle, 2001). In the next graph we illustrate the impact of ICT economic trend on investment in certain services.

Figure 8: Trends in prices of computer equipment and investment by selected services



(Source: Bryson, Daniels, & Warf, 2004)

According to two decades of research in service innovation, Gallouj et al. (2013) situate different views, namely the functional economy (Stahel, 1997), experience economy (Pine & Gilmore, 1998, 1999), service dominant logic (Vargo & Lusch, 2004) and the characteristics-based approach (Gallouj & Weinstein, 1997). Although the characteristics-based approach is only analytical in terms of innovation, Gallouj (2010) implies that the rest of the approaches can be applied to address the issues of innovation as well (e.g. new experiences, new functions).

2.2.4.1. Functional and experience economy

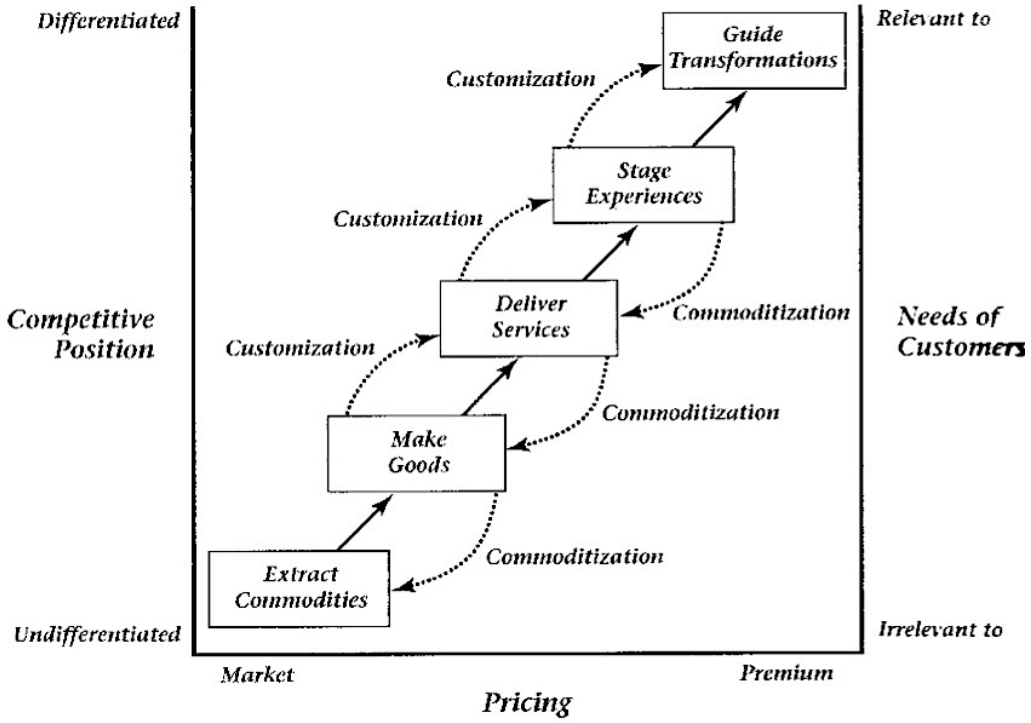
The functional economy aims to optimize "the use (or function) of goods and services and thus the management of existing wealth (goods, knowledge, and nature)" (Stahel, 1997, p. 1). This is achieved with the highest possible use of value for the longest possible time with consumption of as few material resources (energy) as possible, and is based on sustainability of interrelated systems with efficient strategies for management of resources (closing the product and material liability loops).

Such an economy is more sustainable (or dematerialized) than the industrial economy. The move towards a sustainable society will give companies a head start, since real innovation is always supply driven, while the role of demand is one of selection (Giarini & Stahel, 1989).

However, its problem is the requirement of innovative corporate approaches that are not easy to achieve. Firstly, we need to change the industrial to a more service-based economy. Secondly, the economy has to focus on the user if we want to achieve longer functioning of the system.

The experience economy is based on experiences as the fundamental driver of competitive advantage by customization achieved with the differentiation, premium price and relevancy of customer needs and wants (Pine & Gilmore, 1998, 1999). Accordingly, the experiences are the last step in the economic progression of value, just before the transformations that cannot be commoditized, as illustrated in Figure 9.

Figure 9: Seeking the economic progression of value



(Source: Pine & Gilmore, 1999)

Experiences are real phenomena and theoretical constructions (Bijker, Hughes, & Pinch, 1987). Consequently, they do not differ from notions of manufacturing, industry, services or the information (knowledge) economy. Thus, staging experiences "will produce new and useful scientific knowledge" (J. Sundbo, 2009, p. 434). However, just as services are different from goods, experiences are different from services. Usually, their value is commoditized due to technological progress, e.g. Internet technology.

Nevertheless, services are required to stage the experiences, and companies stage experiences also with the help of ICT. Pine and Gilmore (1999) suggest that customer sacrifice exponentially decreases, if the interactions increase.[32] *In other words, companies that are reducing customer sacrifice are closing the gap between the addressed and unaddressed customer needs and wants*. This is an on-going process of competition between the mass customization producers when staging experiences to solve customers' problems when they are using the company's goods and/or involved services. In any case, companies should firstly concentrate on increasing customer satisfaction and eliminating customer sacrifice, and then create customer surprise or suspense.

[32] This is never as smooth as it is mathematically suggested.

However, there is a customer suspense gap between the information about what the customer does not know yet and what the customer remembers from the past (Pine & Gilmore, 1999). The suggestion is that when satisfaction, sacrifice, surprise or suspense are managed in unison then customers are encouraged to buy goods and services for fundamentally different reasons. *"No longer do customers purchase goods merely for their functional use but also for the experiences created during purchase and use. Similarly, clients do not buy services merely for the sake of having a function delivered by another party but for the memorable events surrounding those services."* (Pine & Gilmore, 1999, p. 100, emphasis ours).

This can be achieved with experiences of exploration, experimentation, gratification, and elusiveness; in addition, customer experience innovation via networks, personalization, and particular integration. In any case, each company may adopt a different combination of experiences in a different period of time, leading to a customer surprise and staging of memorable experiences that perish later than services.

Customers also gain experiences with innovation (Prahalad & Ramaswamy, 2003). This is achieved when companies invite customers to co-construct their consumption experience through personalized interaction, essentially co-creating unique value for themselves in an experience network environment. Apparently companies compete in such environments with innovation and competencies. With regard to innovation, the focus is on the experiences, while the competencies enhance the networks, including consumer communities. With regard to the innovation experience, companies respect the user in the process with the dialogue, access, risk and transparency properties of the value co-creation experience (Prahalad & Ramaswamy, 2004).

Companies are participating in an experience innovation economy where experiences are identified as another sector, essentially an economic phenomenon that emphasizes experience as a market factor (J. Sundbo, 2009). Three issues are important to understand why experiences are an economic and sociological factor. *The first* is the society's demand for experiences. In short, the society is looking for social status, more meaning and less boredom, and psychological self-realisation. *The second* is about the company's efforts to produce innovations, namely creativity as a particularity of the experience sector; however, only to some extent. *The third issue* is about technology

and its possibilities to determine innovations that are embedded in a social context, such as young computer games communities or recent SM, lately.

2.2.4.2. Service dominant logic

The optimistic view of "service innovation" has recently argued that all economies are service economies (Vargo & Lusch, 2004). This work is based on value of exchange in use, leading to the definition of economies as service-to-service exchange for the benefit of others. Apparently, this is a central process for value creation that treats goods as vehicles for service provision. Although the argument is that all economies are service economies, goods are still the vehicles of indirect service provision masked by a web of interconnected intermediaries. On the one hand, this adds to the complexity of the market. On the other hand, it facilitates the exchange.

In such an economy, value is co-created with the active participation of firms, customers, users and other stakeholders. However, it has been known for some time that service is a process central to value co-creation and exchange (e.g. Bastiat, 1860; Ricardo, 1817).[33] In other words, value is created only when the customer is integrated and applies the resources of a particular service provider (e.g. a firm) with other resources. However, this logic neglects the embeddedness of the industrial economy. As we will see in further chapters, tangibility is critical to explain the sensory application in the environment, especially with regard to SM. On top of that, it has different philosophical issues which avoid the subject of tangible properties of products. Nevertheless, service dominant logic is a subject of service science that is evolving (Maglio, Kieliszewski, & Spohrer, 2010).

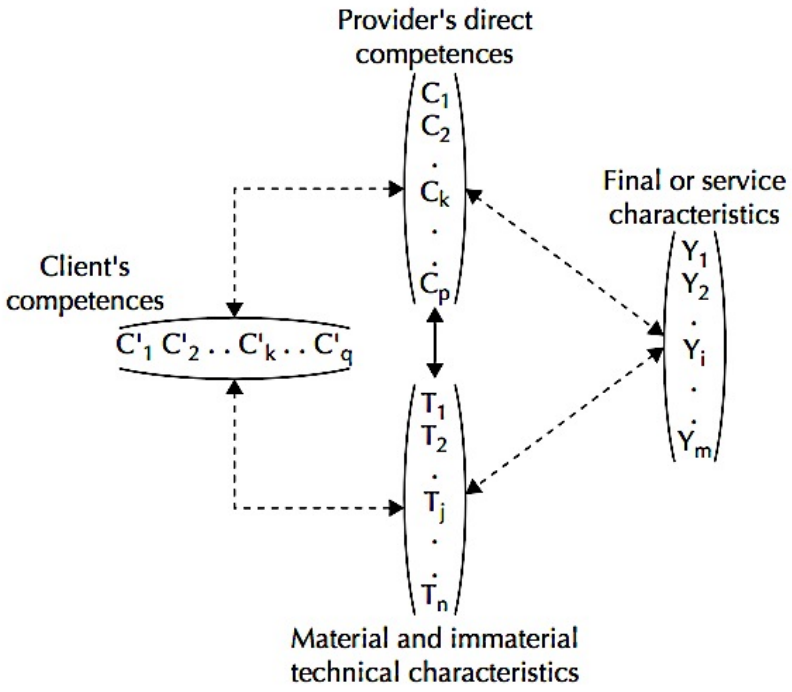
2.2.4.3. Characteristics-based approach

This is the only analytical service innovation theory that is based on service specificities (intangibility and interactivity). It is based on different vectors and meanings of relationship (e.g. mobilization of resources, interaction, co-production) – conceptualized as a product/final service as value of use based on service specificities (intangibility and interactivity). This is actually the (first) theory of service innovation or theoretical (integrative) perspective from Gallouj and Weinstein, (1997) inspired by the Lancasterian representation of goods proposed by Saviotti and Metcalfe (1984). *The*

[33] The co-creation of value is further explored in the user-involvement section of this chapter.

definition of a product (good or service) is based on linking different vectors of characteristics as illustrated in the next figure.

Figure 10: The product as correlated vectors of characteristics and competencies



(Source: Gallouj & Weinstein, 1997)

The model above integrates these characteristics:

- [Y] represents the service characteristics, namely the final users' value.
- [T] represents the material or immaterial technical characteristics of the product.
- [T] includes the characteristics of various technological and non-technological processes of the back-/front-end technical systems, methodologies, etc. that are mobilized to produce service characteristics [Y].
- [C] and [C'] indicate the competence sets of the supplier and the customer or user, respectively. *The product of this vector [C] and [C'] is the supply-delivery interface between the producers and users*.

These characteristics affect the *delivery of a service*, which is simultaneous employment (and relationship) of technical characteristics (material and immaterial) and competencies (internal and external) essentially used to produce the service (or final) characteristics (Gallouj et al., 1997).

The combinations of characteristics are several. For instance, *a pure service* only relates to the vector [C]-[Y], *a pure material good* is a vector of [T]-[Y], *a self service-relationship* is a vector between [C]-[T]-[Y], etc. It should be noted that *the relationship between different vectors is not the same for goods and services*, because such relationships can have different meanings (e.g. mobilization of resources, interaction and so on). For instance, a service can be embodied (*not in technology*) in competencies that are called directly or in an organization. Therefore, the goods intrinsically present the technology, since they provide the use or final service characteristics. In regard to services, technology or goods they are not in essence provided with the final characteristics, "except to some extent in the case of certain quasi-goods that are defined ultimately as the collective or temporary provision of capacities (ATMs, rentals of all kinds)" (Gallouj, 2010, p. 996).

The dynamic properties of characteristics and simple arithmetic functions of addition, subtraction, association, dissociation and formalization are used to conceptualize service innovation (Gallouj et al., 1997). This can be intentionally programmed (e.g. voluntary R&D activity, design, innovation) or emergent as a result of natural learning mechanisms. On the basis of this definition, Gallouj et al. (1997) unfold several models of innovation as given in Table 5.

Table 5: Different types of innovations in (integrative) service innovation

Innovation type	***Description***
Radical innovation	Reflection of a new group of characteristics {[C'*], [C*], [T*], [Y*]}.
Improvement innovation	Reflection of the increase in the significance or quality of certain characteristics without modifying the structure of the system {[C'], [C], [T], [Y]}.
Incremental innovation	Reflection of the description of the addition or substitution of characteristics.
Ad-hoc innovation	Reflection of solutions which allow a given customer's problems (legal, organizational, strategic, technical, and so on) to be solved with some degree of novelty.
Recombination innovation	Reflection of basic principles of dissociation and association of final and technical characteristics.
Formalization innovation	Reflection of the formatting and standardization of characteristics.

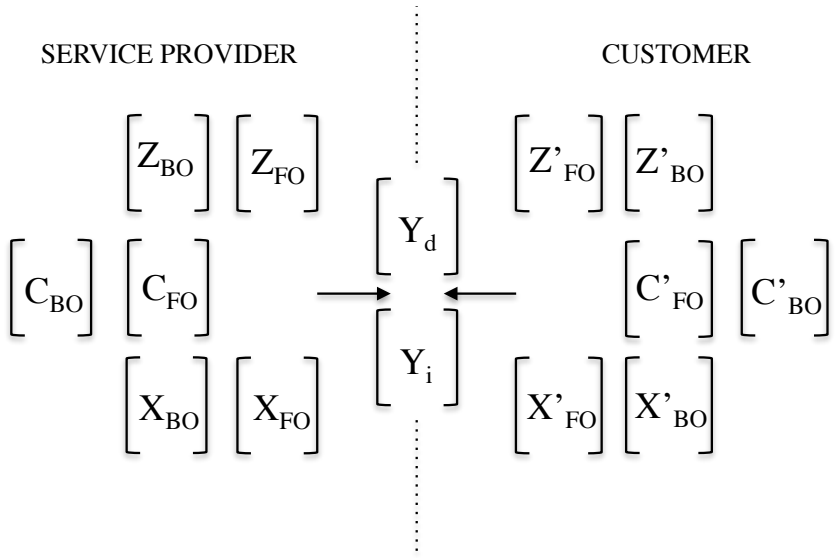
(Source: Gallouj & Weinstein, 1997)

The above formulation of the product (goods and services) can be improved in several ways (Gallouj, 2010), such as the introduction of customers' technical characteristics (T) (a new channel of consumptions and delivery, namely when the consumer is using his or her own technology to access the WEB services) or introduction of other providers' skills and technologies when the service provision is carried out in a network (De Vries, 2006). In addition, the process of service (innovation) is improved with (1) the specific category for the process characteristics (separation from the technical characteristics), (2) division between the front and back office in relation to the provider's characteristics, and (3) inclusion of customers' characteristics, not just competencies, but also technology and process; related to the front- and back-end process characteristics (Gallouj & Toivonen, 2011).

The solution to locate the technical characteristics in the back- and all process characteristics in the front-end or client interface is rejected. Instead, division of the *technical, process and competence characteristics is made to mobilize the interaction with the client or those preparing or being based on this interaction* (i.e. front- and back-office characteristics). Although this is a detachment from the original characteristics-based model, it describes the special nature of a service, while "*it still enables the analysis of both goods and services using the same basic characteristics*" (ibid., p. 41, emphasis ours) (cf. integration perspective).

Different combinations of characteristics present the final characteristics (Y), which are also divided between the direct and indirect characteristics. The direct are the utilities that manifest themselves during the service process, while the indirect are the utilities that manifest in the longer term. The revised characteristics model and content are illustrated in Figure 11.

Figure 11: A revisited characteristics model of service innovation, and content of technical, process and competence characteristics of the service provider according to the front- and back-office division



	Technical characteristics (X)	**Process characteristics (Z)**	**Competences characteristics (C)**
'back office'	- service concept - prototype of the process (blueprints, flowcharts, etc.) - tangible technology - non-technological models and methods - organization - physical environment (e.g. ergonomics)	- those part of the service design and production which take place outside the customer contact; preparatory activities regarding marketing	- competences linked to organizational learning and organizational memory - individual competences mobilised in service administration (e.g. CRM)
'front office'	- concrete results (reports, contracts, software etc.) - tangible and non-tangible technologies mobilised - organization mobilised - physical environment (if relevant)	- the main part of service marketing and those of the service design and production which include customer contact	- individual competences of the personnel mobilised in the interaction with the customer

(Source: Gallouj & Toivonen, 2011)

The strategy of combining and synthesizing the specificities of goods and services into one product has several consequences (Gallouj, 2010). The integrative approach explains the technological and non-technological innovations. The model is flexible and can be used in many ways. For instance, it can explain a material artefact (e.g. a computer or a car) or intangible product (e.g. a consulting service). We have seen how it can explain a pure service, a less pure service or self-service provision. Indeed, it can illustrate the hybrid solutions of goods and services, such as a car and associated

services that are linked to the upstream or downstream (insurance, maintenance, financing and so on) of value generation/production. “These hybrid solutions allow us to understand to what extent innovation in a given good can be based on innovation in associated services, or conversely, innovation in a given service can depend on innovation in associated goods.” (Gallouj 2010, p. 1997). However, the most cited theory of service innovation (Moreira, Guimarães, & Souza Pedro Albuquerque, 2014) and its conceptualization of a product based on the Lancasterian theory of characteristics may be challenged in modern service economies. For example, the difference may occur with the subjective definition of a product as a result of complex interactions on the landscape of SM.

Indeed, the product of service innovation theory based on characteristics has been carefully designed and this is exactly what the Lancaster theory depends on – carefully defined assumptions. This means if the assumptions are removed the theory is not applicable anymore. For example, we may not be able to integrate certain characteristics of service innovation with the SM, if the theory, where its product is based on the Lancasterian characteristics, does not integrate them. Essentially the theory of characteristics may limit the ability of adding together different characteristics, which is something we expect in complex SM interactions.

Recently, the theory of Lancaster has been refuted on the grounds of quality (Bowbrick, 1994, 2014). This is underpinned with the subjective attributes – incompatible with the Lancaster theory – due to complex interactions that are occurring in SM. Although the characteristics-based approach is based on different vectors and different relationship meanings (e.g. mobilization of resources, interaction, co-production), we imply that due to the SM interactions the complexity of the product in service innovation can change. Consequently, this may limit the service innovation theory conceptualized with the Lancasterian product characteristics.

2.3. User involvement in service innovation

This section unfolds user-based service innovation. Needless to say, the SM emphasizes involvement of users and services (inherently) delivered together in interaction with the environment of different contexts. Consequently, *users are the driving force* in the innovation process of services (J. Sundbo & Toivonen, 2011). On the one hand, the focus on a user is natural, since the customer has always been the subject of services.

On the other hand, the consideration of users in innovation is the subject of service production and provision (creation) (e.g. Edvardsson et al., 2006). However, as we will observe, the involvement of a user in service innovation is a two-edged sword. Eventually, it will be important to conceptualize the relationship that organizations and companies establish with the user. Before this, we will review the theories with regard to the positive and negative side of user involvement in service innovation.

2.3.1. User-based innovation in services

User-based innovation in services entails "a person or an organization who or which applied the end result of the innovation process in practice and benefits from it due to the new value included." (J. Sundbo & Toivonen, 2011, p. 5). Indeed, the end result may not benefit the (intermediate or primary) user; however, there may be a network of actors, usually discerned by active and passive/potential users. Consequently, the distinction of users and their roles in services is complex (e.g. users are usually part of the whole process/network, they do not only benefit from the end-result as they do in manufacturing). This occurs due to the specific nature of services where production and consumption process merge (e.g. Edvardsson, 1997; Grönroos, 1990). However, the customer may not even be part of the process. For instance, if the service is "industrialized" and provided without the purchaser, such as cleaning or goods transport (Levitt, 1976; J. Sundbo, 2002) then little encounter will occur. Although the purchaser is (also) the user, he or she may not always be the co-producer (J. Sundbo & Toivonen, 2011).

The user of innovation in services is defined "as a person or as an organization who or which actually or potentially benefits from a service through receiving or through participating more or less actively in its production and development" (J. Sundbo & Toivonen, 2011, p. 6). This is irrelevant to the sector, especially in the case of economic progression of value. Therefore, if a user is a person, then he or she can be a client, customer, consumer or citizen; if a user is an organization, this can be a firm, public organization, association, etc. *The concept of user-based service innovation* (J. Sundbo & Toivonen, 2011) requires the development of a new/modified service, or the conditions of its production, namely: 1) the acquisition of deep and shared understanding of the users' needs, and utilization of this understanding in the development process, and/or; 2) the co-development of innovation together with users.

In co-development the user is, for example, the original source of innovation, a partner in the innovation process, or someone that further develops the launched novelty.

In the material world the innovation process may provide users with new or better tools (Hasu, 2001). This is not necessarily the case in services. *Usually, the distinction is made between "what is being handled" and "what is being changed" and goods, information and persons are commonly regarded as basic groups*. Either way, the concept of the user may be supplemented with the concept of the customer, client, consumer or citizen. But this is dependent on the context and users are not simply individuals, hermetic actors, but part of a social system and culture, including their reference groups.

The user has different roles in service innovation. In general, there are two ways in which users are understood in innovation literature: what their needs are, and how they are related to innovation (Nelson & Winter, 1977; Freeman, 1991; von Hippel, 1986, 1988). These users face needs that will be general to the market, but months or even years before the greater part of the market encounters them. In addition, they benefit significantly by providing solution to those needs. Finally, users have many roles, but they cannot have (certain) different roles at the same time (Humphreys & Grayson, 2008).

The feedback is important in user innovation and versatility of information has been observed: user information should include facts about the customer profile (individual with demographic vs. business with corporate), and sufficiently behavioural information, or information about the development of the user relationship (Xu & Walton, 2005). Indeed, information should not be only gathered about the user, but also from the customers (Rowley, 2002), which often includes weak signals about future developments. In this case, service encounters have been emphasized to counteract the problem of surveys showing that users are always satisfied.

Recently two views are emphasized: 1) the role of users' experience, and 2) the importance of elaborating information on users' needs into shared understanding within the provider organization.

- *The first view is focused on the lived experiences (phenomena) of the service and on social networks as the framework for experiences (e.g. Payne, Storbacka, & Frow,*

2008). The holistic nature of experiences enables services to be created with the tangible elements together and create the overall user experience. In regard to innovation in services, the experiential approach reveals an aspect that other approaches have usually ignored, namely that novelties are not recognized and perceived in a similar way by different actors. Consequently, there are novelties that service providers define as innovations (also in an economic sense); however, these novelties may not be useful from the user's perspective.

- *The second view highlights that information gathering as such does not guarantee its purposeful application*. In order to be applicable, user information has to be structured, elaborated, interpreted and shared within the organization. The formation of shared understanding of the interpretations and implications regarding user information is often much more demanding than the gathering process itself. However, it is crucial for successful practical operations and organization strategy (Nordlund, 2009).

The involvement of users has also been part of *the innovation process after the launch*. Tuomi (2002) describes the process from a technological view (e.g. new technologies are not completed and unchangeable artefacts, but are very often modified in use, and therefore include an element of re-invention). Indeed, technologies are actively interpreted and appropriated by the users; each technological artefact can have different meanings for different user groups. J. Sundbo (2008) recognized similar phenomena as *after-innovation in respect to e-services*. Namely, innovation in these services is not completed when the technology is launched on the market, but adjustments need to be made if it is to be successful. The reason behind this finding is the difficulty of basing innovation on customer knowledge before the launch, because customers cannot say beforehand what they want (due to difficulties in assessing prototypes). They can react by suggesting ideas for improvements when they use the service in practice.

User-based innovation is about social processes where actors inside/outside a firm play a role. However, many firms that have tried user-based service innovation are not successful (J. Sundbo & Toivonen, 2011). Essentially, the focus of user-innovation research is on how companies are acting upon the resource of users and how these are incorporated. This is observed in the customer-employee relationship, including managers' encounters. Two concepts are identified with regard to user-based service

innovation. *The first* is the "bricolage" (Fuglsang, 2011), which considers and tries to understand the role of the user-employee encounter. *Findings show that employees' ad-hoc solution to the client's problems is a source of service innovation. The second* concept is "othering" (D. Sundbo, 2011), which also considers such a relationship, but with the opposite finding, namely that *the profession is limiting the employees in relationship with a random customer*.

2.3.1.1. "Bricolage" as way to make use of input from users

If innovation is seen as serendipity, then the encounters between the employees and users should be ready to explore unpredicted paths. In this case the "innovation can take place in small steps based on staff experience and initiatives" (Fuglsang, 2011, p. 26).

Solving problems with the users here and now in an ad-hoc and active approach to innovation in an unpredicted or even a forbidden way is approached via (incoherent) practice-based theory; a set of theories and concepts (Latour, 1990; Callon, 1986; Czarniawska, 2004) that attempt to explain the nature and transformations of human activity as a distributed and continuous process in which a set of heterogeneous resources are pulled together to achieve some kind of temporary meaning, stability and continuity (cf. individuation of resources brought together over time to achieve meta-stability).

Fuglsang (2011) argues that users should not merely be seen as sources, but rather they should be *invited in and offered "concrete activities that bind the user together with the enterprise in a concrete meta-stable system."* (ibid., p. 29, emphasis ours). This is how the user-innovation becomes meta-stable and "bricolage" is a way to achieve this in an ad-hoc but effective way. *Firstly*, modern organizations are complex with active mutual obligations, and pluralistic; their people have different backgrounds, skills, resources that must be coordinated. In this case, *the top-down and bottom-up approaches* meet and present problems that have to be dealt with ad-hoc. *Secondly*, in modern organizations people want to change things for the better via their jobs; they resist changes that they do not understand or they cannot identify with.

Indeed, users are imperatively involved in innovation, including their resources at hand. They solve problems ad-hoc, evident in the case of front-end staff, entrepreneurs or municipality. In addition, the diffusion of knowledge, the construction of networks and implementation of new innovations also have the form of "bricolage"; usually in an

unpredicted or unstructured way, diffused by a *word-of-mouth* that is determined by the availability of volunteers and use of results with regard to problem-solving. The advantage is within the bounds of the inside-out practice of producers and users in service innovation.

"Bricolage" has great potential for user-based innovation in the daily activities of front-line staff, managers and network-relations that solve problems of users ad-hoc through resources at hand – an "emergent phenomenon that becomes meta-stable by working inside-out with practical problems" (Fuglsang, 2011, p. 41), especially in cooperation between the employees and users for further innovation process-development that should be visible and legitimate. On the one hand, the "bricolage" avoids the structured way to professional work, which could be exploited pragmatically at different levels in the organization. On the other hand, its emergent approach will probably be hidden, because ideas may not always be favourable to management. Therefore, it is important to look at what users do and say rather than categorize their views according to their motivations for user-based innovations. Either way, this implies an autonomous approach to innovation as another small incremental step closer to the innovation.

2.3.1.2. "Othering", or how the professional mind hinders user innovation in services

The integration of users may not always be favourable. This is not only the case for management, but also for service innovation, especially in terms of the encounter between professional and non-professional social relations. For instance, user-based service innovation also follows the concomitant process of encounters that may hinder the innovation process in services, especially if *the communication between the front-line employee and service user is challenging* (D. Sundbo, 2011).

Although professionalism is important, this is rather defined in terms of the negative and positive aspects of the perspective from which we look at it. For instance, professionalism is traditionally taken as a better service performance quality or a positive motivating tradition. On the other hand, it is seen as an organizational ideology forced upon employees or a negative external demand tradition.[34]

[34] See D. Sundbo (2011) p. 47 for a debate.

The concept of "othering" has been used before (e.g. J. L. Johnson et al., 2004). The focus is on mental differences between (two) persons, namely the different mental process similarities or differences that have a meaning of value. "[T]he mental focus is predominantly on the ways in which an individual or a group of people are divergent or even contrasting to oneself while any similarities may be unreflectively taken for granted or even ignored." (D. Sundbo, 2011, p. 57). The difference between the two mental processes is the locus of interest that is linked to a hyper-professional mind-set – the more professionalism is emphasized, the less non-professionals seem relevant. The professions are knowledge-based occupations that usually follow tertiary education, vocational training and experience, which is not the same as classical professionals or hyper-professionals who are without such training.

Therefore, it is easier to not relate each other, but rather have a general attitude and mind-set in service provision. For instance, a traditional professional mind-set may focus on service customization, but the hyper-professionals may strive toward excellence whereas best practice becomes standardized and formal. Indeed, *two different people do not necessarily have (share) the same insight about the same thing – divided by the "space of living" – that seems to be "unfortunate" for innovation* (D. Sundbo, 2011). It seems unreasonable to ask users for ideas with regard to innovation due to limited interaction. In other words, either user involvement or ideas are "systematically disregarded as a result of staff space of living and the process of othering" (ibid., p. 60).

This has implications for user innovation in service encounters. Although inward looking employees are usually coherent, this is not the case for the front-end staff who are outward looking, especially when the service users are important in innovation due to motivations; similar to the case of "othering". In this case, the other can be either positive or negative (neither undesirable, nor unavoidable) with barriers to user innovation: "lack of ideas, miscommunication or no communication of ideas, lack of understanding ideas or of users' general needs, and a wrong implementation of ideas" (ibid., p. 64). This is not even relevant if the front-end staff do not recognize the importance of user innovation. Indeed, it may require training to make the front-end staff aware of this and to gain understanding of their users.

2.3.2. Relationships in user-based service innovation

Different relationships exist, such as interaction, servuction, co-production or co-creation, etc. However, the research is moving from can the users cope with the process or usability' to the 'attitudes of users' experience in the process (J. Sundbo & Toivonen, 2011). If companies wish to innovate in this process they need access to the "sticky information" of the customer's daily life (Von Hippel, 1994). Sticky information should be obtained without being deliberately initiated, though (Kristensson, Matthing, & Johansson, 2008). For instance, typical surveys and interviews are not enough. In addition, the interaction should be instant/complete (see Chapter 1 on p. 26) so that the user can be an active participant. The idea is to be as close as possible to the user's real life, not only when the new services are tested, but also during the early phases of the service innovation process of the user's changing roles (Edvardsson, Gustafsson, Kristensson, & Witell, 2010).

A two-way process of listening and communication before, during and after the transaction with the customers, to respond to the current and future customer needs of situational rather than personal characteristics, is becoming increasingly evident. But this is a paradox due to the changing role of the customer (Edvardsson et al., 2010). On the one hand, we want to be close to the customer to understand their needs better. On the other hand, the technology is changing the face-to-face relationship; increasing the distance between the customer and service provider. "[C]ustomers do not interact with employees, they meet technology" (ibid., p. 303). This affects the quality of information, because the customers/employees are hindered in articulation of what they need and want. Indeed, the technology introduces its own complexity of possibilities and limitations with *implications* for the relationship with the user, namely involvement in the development process of products/services.

The relationship is in this thesis observed with the concept of co-creation and co-production. On the one hand, it is considered that value is created when the innovation process is over (Lusch & Vargo, 2006a). For instance, the phenomenon of co-creation occurs when the user is realizing the value when product or services are in use. On the other hand, the phenomenon of co-production actually occurs in the innovation process, but only with partial value in use.

The value *co-production* is found in the transition of the industrial model, namely the technical breakthroughs (e.g. distributed processing, concurrent engineering) and social innovations in actual value creation render value more synchronously, less sequentially, more interactively, non-linearly and transitively, because more actors participate in value creation per unit of time and space than ever before. "Value is not simply 'added,' but is mutually 'created' and 're-created' among actors with different values" (Ramirez, 1999, p. 50). However, this process derives value propositions; achieved with a firm's resources to co-design, achieve customer assembly, self-service, etc. The integration of the customer and firm in co-production is dependent on their conditions. Therefore, the co-production is optional, while the co-creation is not (Vargo, 2013).

The value *co-creation (experience)* (Prahalad & Ramaswamy, 2004) is recently identified with the high quality interaction between the firms and customers to unlock new sources of competitive advantage with the ICT. A firm must enable full interactivity with the customer who is the locus of value creation and extraction. In this case, the customers are integrated at the beginning of the innovation process to co-construct the service experience that suits their context. However, it is about the joint creation of value by the company and customer in every step of value process. The role of the firm is not to please the customer, but rather to cooperate and co-create an experience environment with the customer. The product can be the same (e.g. Lego), but experiences are different. This is a drastic departure from the traditional customization of new products where value is produced during the production process. In co-creation the value can only be determined by the user during the consumption and usage process (Michel, Brown, & Gallan, 2008; Lusch et al., 2007). The key *distinction between co-creation and co-production* is illustrated in the next table (Chathoth, Altinay, Harrington, Okumus, & Chan, 2013).

Table 6: The key distinctions between co-production and co-creation

	Co-production	Co-creation
(1) Value creation	Extraction of economic value Quality products and services	Creation of unique personalized experiences
(2) Customers' role	Passive (rely on the physical environment provided) Perceived as a resource	Active (provide input to service provider before, during, and after the service) Information provider Value creator
(3) Customers' participation	Mainly at the end of the value chain	Repeated interactions and transactions across multiple channels Serves as an operant resource
Customers' expectations	Suit their needs to what is available	Co-create products and services with customers
Key actors	Managers and employees	Customers, managers and employees
(4) Focus	Production and company centric	Customer and experience centric Engaging customers High level of information processing
(5) Innovation	Led by the firm	Co-innovate and co-design with customers Learning from customers (opinion leaders and trendsetters) and the process
(6) Communication	Listening to customers Less transparent	Ongoing dialogue with customers Open and transparent communication

(Source: Chathoth et al., 2013)

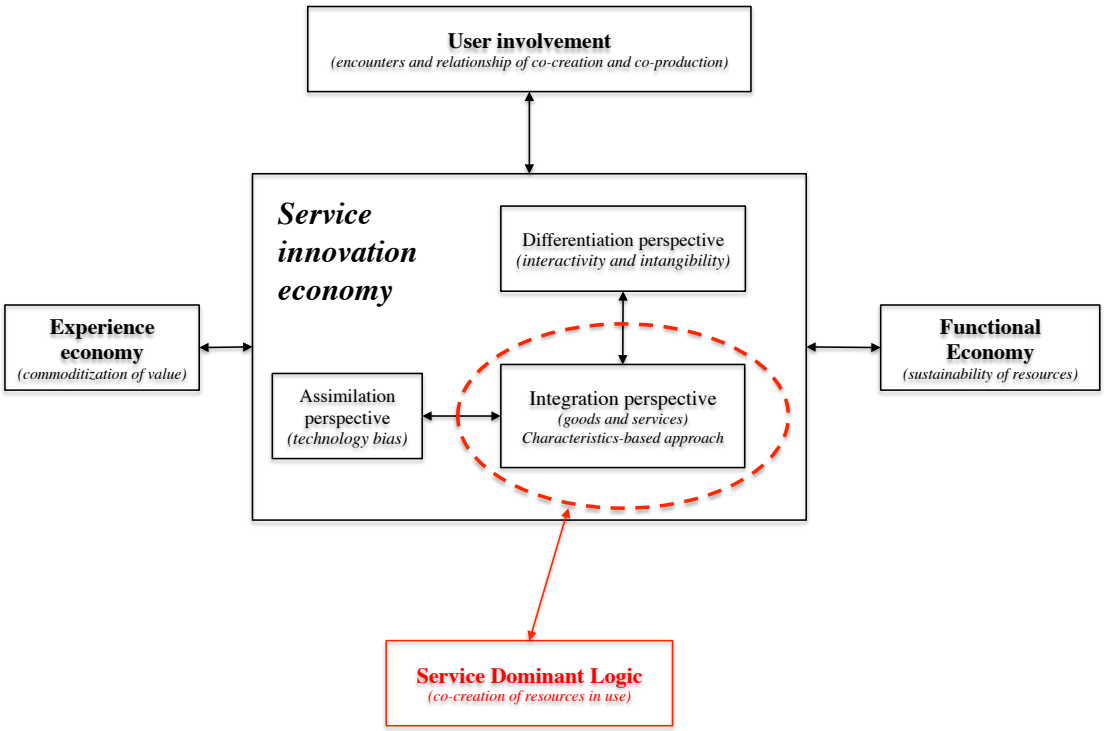
Value co-creation is beyond the customer's involvement in production, design customization or assembly processes. Consequently, it may sound as if production and manufacturing seem to be of lower importance in value co-creation, but this is not the case. Actually, the difference between co-creation and co-production aims to highlight the role of co-production as a superordinate process of value co-creation (Vargo, Maglio, & Akaka, 2008). Recently the term of "co-creation" is used to convey the customer's role of *collaboration* in value creation (Lusch & Vargo, 2006b). On the other hand, co-production has been used to describe the participation of users (and others) in the development of the firm's offerings (e.g. design, self-service). Based on these conceptualizations "the [user's] role in *co-production is optional,* whereas his/her role in value creation is not; *value is always co-created*" (Vargo, Lusch, & Akaka, 2010, p. 143 emphasis ours).

2.4. User-based service innovation with the social media

In previous sections, we have reviewed service innovation and user involvement literature. Next we synthesize these theories into a concept of user-based service innovation (UBSI). The synthesis of these theories, namely user involvement of value in use (co-creation) and exchange (co-production) is possible due to the analytical capability of the characteristics-based approach as a final function of the product (goods and services) in service innovation. Although service science, namely SDL, is an alternative conceptualization of the integrated service economy, as indicated in Figure

12, it does not provide the conceptualization of service innovation. In addition, it has issues with validity (M. Wright & Russell, 2012).

Figure 12: The concept of user-based service innovation



In general, the UBSI concept is derived from the integration of tangible and intangible nature and forms of innovation. As noted, both (goods and services) are essential for service innovation, especially with the user and his or her relationship to the exchange and use of different sources. The flexibility of services enables the integration of experience, and functionality/sustainability economies' principles – the user is essential to gain competitive advantage. With regard to the experience economy, the emphasis is on customization in differentiation, price and relevancy of customer needs and wants. With regard to sustainability, the emphasis is on optimal or functional use of sources, namely the husbandry of goods, not production of new goods. In both cases, services are used to assure the value in economy with emerging (virtual) interactions with the user (of SM). When the SM is leveraged with the USBI concept, which integrates the technological and non-technological innovations (e.g. different competencies of users, material and immaterial) in the final product (service and goods), then the dominant type of innovation process is complex and is seeking the solution with the user (of the

SM) in the front and back office. In the next few paragraphs we discuss the UBSI concept and identify certain specificities with regard to SM.

2.4.1. Notion of technological specificities

We acknowledge the latest developments of ICT[35] with regard to the hypotheses in the assimilation perspective enforced by the UBSI concept. Namely, mainframe computers influence the back-end (office), while the decentralized IT/networks influence the front-end (office). This is the main technological driver of service innovation and SM.

Currently most of the organizations are consuming SM as made elsewhere. In this case, SM is linked to the mainframe computer (e.g. in-house solutions of real-time data analysis) or to the back-end of the innovation process. Consequently, the organizations are enlarging the economies of scope. On the other hand, when the SM is leveraged with the decentralized networks (e.g. Internet), then the organizations are exposed to the interface change with the user or front office. In this case, the organizations introduce positive effects on employment (of a certain kind), skills, tradability, and possible quality productivity by linking the SM with the front-end process of innovation. Recently we can observe how large organizations (e.g. New York University) are integrating hundreds of SM accounts of "hybrid networks" due to the decentralizing effect of online social networks (Yeung, Liccardi, Lu, Seneviratne, & Berners-Lee, 2009). In this case, the effect of linking SM and service innovation manifests in economies of variety. Consequently, a different conceptualization of (service innovation) performance is required.[36]

The organization can relax this type of SM adoption with autonomous and endogenous conceptualization, because services are in a position to produce their own technical systems. Needless to say, the SM user is already entangled in different relationships and contexts. With regard to the internal origin of SM use, organizations leverage services with the (active) technology of SM and design complex types of hybrid solutions between organizational engineering and SM. This is not only challenging in the back office, but also (underestimated) in the front office which links the back office.

[35] See Chapter 1 in regard to technology and SM as a notion of technological progress in digital economy.
[36] Advanced with the Web (3.0) technology as described in Chapter 1.

2.4.2. Notion of non-technological specificities

Interactivity and intangibility in nature and forms of innovation are influenced by the application of SM. We can assume this is an incremental trend, namely that SM is replacing certain (economic) properties of physical exchange. In this case, the emergence of knowledge intensive (business) services is apparent. On the one hand, the specificities of KIBS (interactivity and intangibility) are weak in low knowledge intensive services, such as catering and transport. On the other hand, those specificities are part of hybrid services of less knowledge intensive sectors, such as the application of SM in tourism, museums, transport (e.g. Nack, 2012); generally assumed to be the subject of diffused emergence of knowledge intensive services. Indeed, the power of intangibility and interactivity is leveraging and/or transforming the SM, namely due to the non-linear cooperation between the service provider and user of services.

In the experience economy it is suggested that with increased interaction, the user "sacrifice" in experiences is reduced. With the UBSI concept we observe this as how different roles of users in different relationships and encounters are leveraged in companies. Needless to say, the interaction with the user is dependent on the technological and non-technological properties. In this case, the use of resources in sustainable exchange and consumption is imposed. This implies that with the adoption of the UBSI concept an advanced level of knowledge (experiences) can also be achieved in service innovation with the SM.

Due to the integration perspective we imply that with the UBSI concept the SM can be leveraged to narrow the gaps of different experiences as found elsewhere (see integration perspective, section 2.2.4). This is achieved with the involvement of the SM characteristics in the innovation process. For instance, organizations leverage the encounters of users and employees in unpredicted innovations. Consequently, they are not just reducing the customer's satisfaction and sacrifice in experiences due to the increased SM interactions, but they are also aligning the awareness of potential innovations, especially with the local environment of different and particular contexts. In addition, with the use of SM in innovation, the gap in the customer's surprise and suspense are narrowed. Due to the omnipresence of SM in the digital and physical world, we assume that customers also gain certain experiences with the SM.

However, this is only partially true, since the customer has to "consume" the value before it can be fully experienced. Basically the consumption is dependent on the relationship in the local context. In this case, the organizations sustain the customer suspense of their offerings via co-production, whilst the organizations also "educate" the customer with the interactions of the local context in co-creation with the SM. In this case, the emphasis is on intangible and interactional characteristics of SM. For instance, organizations can exploit the interactions and collaboration characteristics of SM in particular encounters. Indeed, different strategies can be used to reduce unmet social needs with SM (see Chapter 1).

2.4.3. Implication of embodied knowledge specificities

The embodied knowledge in service innovation with the SM is emphasized with the processing of information, eventually the employment of knowledge as information (a public good). Needless to say, firms are users, diffusers and sources of knowledge codification in services. However, knowledge codification is dependent on the context and introduced irreversibility of the learning process, which requires cooperation of the embodied knowledge. We assume the processing of information (knowledge) with the SM is driven by the current (emerging) economy with the external economies of cognitive scope (Nooteboom, 1992); *in a digitized economy executing unseen processes* (Arthur, 2011).

In Chapter 1, we have seen that interactions on the SM landscape posit sharing of tacit knowledge; creating different contexts. As a result, we assume that SM benefit service innovation from the inversion perspective and user involvement (in new-knowledge production and cooperation across firm functions) as captured with the UBSI. This assumption is inevitably related to the internal/external encounters of users and employees, as described by the concepts of *bricolage* and *othering*. For instance, the organizations and users innovate in the relationship of certain instances of co-production and co-creation.

In this case, the encounters are emphasizing interactivity and intangibility to sustain the variety and diversity of service innovations (Gallouj, 2002b). We support the hypothesis with regard to the Schumpeterian notion of circular flow, namely that the SM activities may help to keep the clients in the circular flow and prevent a firm from disappearing in the turmoil of creative destruction. In addition, the activities of SM may help to

facilitate firms' exit from it; with innovation. We imply that due to SM interactions, organizations can keep their clients in the circular flow by departing from their own circular flow through innovating, or staying in a more routine service provision.

2.4.4. Implication for the performance and innovation gaps

Service innovation economies suffer from two major gaps (Djellal & Gallouj, 2010). For instance, we see that service innovation is also subject to knowledge accumulation that can also be captured with the SM-supported innovation indicators and knowledge that depends on different contexts and introduced irreversibility of the learning process in terms of technological, social and economic interactions. (See Chapter 1.) In addition, the SM indicators are emerging as a measurement of innovation in the digital economy. We imply that with the UBSI concept and SM, the innovation gap can be narrowed.

Hidden forms of interactions also influence the "performance gap", namely the difference between the reality of performance in service economies and performance as measured by the traditional economic (production and growth) tools. For instance, the economic actors are not inactive. In addition, services are not only contributing to the transformation of material objects, since they also create tangible objects with intangible processing (e.g. KIBS). Furthermore, services develop methods and toolboxes, standardization of cases, etc. Finally, theoretical and methodological understanding, namely the nature of a product, should be improved. The hypothesis is that productivity is undoubtedly less problematic than the methods used to measure it (Djellal and Gallouj, 2010). For instance, what is the performance output of SM in today's economy? The measurement of output in terms of static productivity is replaced with the measurements of the output based on the activities that make it up. In services, the performance cannot be captured solely with the notion of productivity, because multi-criteria/dimensionality of performance measurement is required, including the quality of interpersonal relations, empathy, trust, relations, etc. We imply that with the UBSI concept and SM, the performance gap can be narrowed.

In addition, both gaps do not consider the importance of measuring the participation of users in service innovation as conceptualized by the UBSI. Integration of the user is an opportunity to narrow both gaps, since users are an increasingly important source and collaborator in the innovation process. For instance, 80% of the innovative firms in

Finland incorporate users and their information (Niemi & Kuusisto, 2013). Such user integration is increasing with organizations' growth, and is common for service and manufacturing firms. However, it seems that services are exploiting users' information and joint development slightly more.

2.5. Conclusion

In the above sections we have presented the conceptualization of the UBSI concept on the basis of literature in service innovation and user involvement that we discussed with regard to SM. In general, we unfold a continuum between the technological and non-technological innovations in relationship with the user of SM. Needless to say, this continuum is seeking a reasonable balance between the manufacturing and service sector activities in front- and back-office activities.

The nature and form of technology is an emergent system that is eventually materialized with services, while innovation is achieved with intangibility and interactivity. The omnipresence of SM interactions with the UBSI concept imposes another level of embodied knowledge integration in service innovation. In this case, service specificities are leveraged with the integration perspective, namely with the characteristics-based approach that considers goods and services at the same time in an economy of functional sustainability and experiences as a superior form of intangibility. Indeed, the tangible or intangible technologies do not exist per se. This is an intrinsic interactional couple linked in a network typology that we explore in the next chapter.

3. SYSTEM FRAMEWORK AND INTERACTIONAL MODEL

In Chapter 1 we have found that SM are omnipresent technologies that enable collaboration on a vast medium (e.g. Internet)[37]. This is influencing the interactions of technological, sociological and economic factors, which emerge in continuous communications between users with different knowledge of certain context/s. In Chapter 2 we saw how services leverage the medium to process knowledge for innovation in technological and non-technological waves of interactions. In fact, service innovations synthesize in the evolution of networks across different sectors. In this chapter, we suggest a system with the elements of communication, interactions and networks to capture such interactions in economy of service innovation networks across different sectors and across hierarchical levels with the SM.

Knowledge examination and its dynamics are the necessity of modern service and of innovation economies. However, the treatment of knowledge as public good is no longer profitable; rather tacit, local and complex knowledge are emphasized. "By focusing on the generation and dissemination of new knowledge, from the point of ... knowledge dynamics, severe nonlinearities enter the [...] economic system, decisively affecting the dynamics of the sectorial development and composition of an economy." (Hanusch & Pyka, 2007, p. 3) As a consequence, *we are seeking a dynamic and heterogeneous system capable of navigating varying competences and capabilities for industries at very different stages of maturity across different sectors, regions and nations*. Indeed, the coexistence of such a system is strongly enriching the complexity of the economic systems under analysis.

In the following, we firstly present the system as a morphology of different systems. We identify the scope of the system through the relationship between the system's elements and its attributes. As a result, we present and explain a potential configuration of the system. On basis of this configuration we recognize the potential interactions that could be leveraged with the SM. Accordingly, we conceptualize the interactional model and explain the factors enabling innovation in services with SM.

[37] A recent intiative of Facebook is to bring closer the crucial actors of the ICT industry, non-profits and local communities, and connect the two-thirds of unconnected people in the economy around the globe (www.internet.org, accessed March, 2015). This will spur further interaction with unexplored contexts.

3.1. System of communication, markets and service innovation networks

According to the SM interactions in technological and non-technological innovations from different contexts, and the imperative participation of users in the innovation process, we are faced with the invisible innovations that are unpredictable, complex manifestations of hybrid networks. For instance, how can we understand the innovations that are not yet apparent, but are emerging from the omnipresent interactions that are occurring via SM? How do we grasp the complexity of interactions manifesting themselves in networks of service innovations across different sectors? Such interactions are very welcome in service innovations, but currently we do not know how to grasp the network of such interaction with SM in a systematic manner. Consequently we impose a system that responds in such environments with invisible, unpredictable and complex interactions in service innovation networks across different sectors.

In general, the interactions between the actors in modern service innovation economies also occur in the landscape of SM and the market is based on the interaction with the environment. Indeed, the market of the interactions should embrace the physical objects and the existing principles of evolutionary economies' (dynamic) exchange of traditional innovation networks (INs). However, our system adopts the concept of service innovations networks across public and private sectors – ServPPINs (cf. Gallouj, Rubalcaba, & Windrum, 2013), which improves the INs of already entangled services with a more strategic position. Particularly, we include the use of value (in context) and integration of tacit knowledge. This is a constant SM occurrence in the relationship between the physical and virtual contexts (interactivity, co-production, co-creation, etc.). Indeed, we do not only offer the conceptualization of the service innovation in the landscape of SM, but also the stabilization and competitive integration of agents in omnipresence/changing information and knowledge network economy.

3.1.1. Elements of the system

On the basis of innovation duality and the omnipresent interactions of SM, we suggest a theoretical construct that involves the following three systems:

i. *The C (communication value) element is based on the cybernetic theory of a circular circuit/network with different feedback mechanisms' capability of metadata production and consumption that resides in the mind. With cybernetics we define the communicational value of the system, namely information exchange with the environment.*
ii. *The M (market value) element is based on the size of the investments required to frame the interactions that contain overflows in the physical and virtual environments. Both are important market drivers. On the one hand, the "human framing" is emphasized. On the other hand, the SM developments are changing the market to "computational framing". Either way, each market involves a particular behaviour (a combination).*
iii. *The E (economic value) element is based on the dynamics of economic evolution in networks of sectorial co-evolution introduced by Schumpeter. This has been recently observed as service innovation across different networks of sectors or ServPPINs (Djellal & Gallouj, 2013) with relation to and with implications for the development of a family of natural environments (cf. Andersen, 2012) enabled with the UBSI concept (see Chapter 2).*

The morphology of the above systems presents a complex socio-techno-economic adaptive system with mutually dependent elements. Now we describe each element.

3.1.1.1. Communicational value

The C element adopts the theory of cybernetics (Ashby, 1956; Wiener, 1948). Cybernetics was advanced and broadened in industrial dynamics (Jay W. Forrester, 1961, 1987; Jay W. Forrester, 1997) to include other social and economic systems. Such systems behave in terms of cause-and-effect relationships due to the feedback linkages among their elements. In this case, the system is capable of determining the appropriate boundaries and defining what is to be included. Essentially this is a circular circuit (network) with different feedback mechanisms of metadata production/consumption that resides (only) in the mind; information exchange is in the environment.

Consequently our system is a holistic/non-summative whole that cannot be reduced to its parts without altering its pattern. However, the constituent elements can be added/subtracted, altering the overall system. Such systems increase in complexity due to the interaction between the input and output, and feedback. The analogy of feedback generates information and innovates novelty. Due to the recursive operation of negative and positive feedback elements within a system, they are informed and differentiated. Hence, they are able to grow and evolve as a communication system that responds to difference in information. However, it is the owner of the system who determines to what the system will respond.

"The minimum elements … are a 'receptor' accepting stimuli (or information) from outside as input; from this information a message is led to a 'center' which in some way reacts to the message … ; the center, in its turn, transmits the messages to an 'effector' which eventually reacts to the stimulus with a response as output. *The output, however, is monitored back, by a 'feedback' loop, to the receptor which senses the preliminary responses and steers the subsequent actions of the system so that eventually the desired result is obtained*." (Von Bertalanffy, 1968, pp. 40–41 italics ours). Indeed, the interaction between the input and output is a key to the system's self-organization and self-stabilization as the effect of chains of cause and effect in the *simple* or *complex* function of nesting.

The function of nesting is identified as a (simple) circular system containing elements such as A, B, and C – so related that an activity of A affects an activity of B, B affects C, and C has an effect back upon A (Bateson, 1958). *Secondly, this function unfolds as a (complex) recursive process of the feedback, which links the causal variables in a continuous flow of information – network*. Consequently, the feedback exhibits properties of unexpected interactions, such as mutual causal loops of active influence on each other, either in a given system or subsystem, between systems and so on (Maruyama, 1968). Namely, A may affect B in a way in which B does not influence A. Yet only where A's effect on B is qualified by B's effect on A, or where A is modified by its effect on B, is there a feedback loop and mutual causality in a strict sense.

Such systems are a differentiated sub-whole within a systemic hierarchy. The environment in which the system exists is another (whole) system, a meta-system. As a subsystem, the system's characteristics and operations are co-determinative components of the larger system within which it is an integral component. Thus, a system may have

two sharply contrasting characteristics. As a whole, it faces inward – the system is concerned with maintaining its internal steady state; as a sub-whole, it faces outward – the system is responding to its environment in a potentially infinite regression of relevant contexts – a meta-system.

In our system the energy and matter are only appropriate when they function as information; they have a communicational value (cf. Bateson, 1979). Indeed, the mind is to be identified as residing only within the boundary of our physical body, and is somehow radically separate from others. This is beyond the complexity of systems, including a system consisting of multiple systems with living or non-living parts (Bateson & Bateson, 1987).

The phenomenon of *coding* is an integral element of feedback in cybernetic systems of epistemology (Bateson, 1979; Bateson & Bateson, 1987). Such systems are only capable of knowing the present mind. In other words, the process in which the information is translated and encoded into a new form (only then is information available for further stages of performance) limits the perception of mental systems to images that are meaningful. Accordingly, only relevant entities/realities are messages, which are actually in the realm of relationships (meta-relationships), context and context of context (aggregates of information that make a difference), which could be identified in a potentially infinite regression of relevant contexts.[38]

The hierarchy of a system and its subsystems is observed (as maintained) via structured interactions, with self-organization and mutual adoption acting as hierarchical restraints; regulation of a gradual process or an unconscious assimilation of ideas exchanged between its differentiated levels. In this case, each level of the hierarchy builds on more basic levels of organization; integration of pre-existing subsystems and micro-hierarchies into novel patterns designing new, more inclusive patterns.

Whole systems never emerge from scratch and growth is inevitably based upon the organization of pre-organized components delimited by hierarchical limitations of stability, economy and speed in revealing new forms of life and more complete hierarchical levels (Simon, 1977). Indeed, such hierarchies are present also in social/behavioural sciences where cybernetics reveals a new paradigm of science that redefines and initiates theoretical advancements (Bale, 1995).

[38] Indeed, this is the Berkeleyan world of communication where only ideas (differences, news of differences, images or maps) and information about "things" are accessible to the mind.

3.1.1.2. Market value

With regard the M element, we adopt the notion that "market is not simply expanding, but rather continuously emerging and re-emerging. Its consolidation requires constant and substantial investments" (Callon, 1998, p. 245). This is derived by the framing of overflowing beyond the economic externalities (Coase, 1960) with the invisible transfers (Callon, 1998). For instance, the indirect (non-commercial) effects of commercial activities unfold within a framework of market relationship (the "flowing" definition of the concept of externality). Consequently, market failure creates the gap between the private marginal income and marginal social costs, leading to social externalities not achieved in practice. The negative externalities imply social costs that are not taken into account by private decision makers. The positive externalities discourage private investments by socializing the benefits. Either way, different issues of overflow and its presence are examined using the concept of frame (Goffman, 1974). Accordingly, the result is the conceptualization of the size of investments required to frame the interactions and its overflows (actors with cognitive resources, and strategies shaped by previous experiences) in a network of connections with the environment of different framing – various physical and organizational devices of the "outside world" (Callon, 1998).[39]

The first type of framing is *the norm and overflows are the leaks*. In this case, the interaction is negotiated, but when complete it turns to anonymity. Indeed, interaction is a close, but transparent space (e.g. each individual considers another's point of view when reaching a decision). The design of the frame is put forward to avoid or capture the premature overflows. This involves the identification of leaks, formulation of devices for creating more effective frames, and facilitation of certain/typical situations, which enables the establishment of trial-and-tested frames with harmful effects considered in advance.

The second type of framing is *expensive, always imperfect and overflows are the norm*. In this case, the framing requires expensive physical/symbolic devices with omnipresence of overflows – embeddedness (Granovetter, 1985; K. Polanyi, 1957). This cannot be disassociated from the network of interdependencies/interactions (beyond relationship). On the one hand, the stability of the agreement is framed with the

[39] A simple analogy could be a game of chess, where the rules are essential to physically outline the world in which action will take place – traditional equipment with a social history (cf. Goffman, 1961; Latour, 2012).

devices (costs) that have only a marginal role (Williamson, 1993). On the other hand, it is exactly these properties that enable the interactions of potential overflows.

Framing of the interactions occurs in access to wider networks (capitalization of certain engagements). This is a *paradox*, because it is impossible to internalize every externality or equate the incompleteness of the frame. In addition, the sources are driving the emergence of framing devices, including its purpose. Needless to say, framing is costly and always incomplete.

On the one hand, the problems of overflows are identified in measurements. On the other hand, the identification of overflows enables the reframing of interactions within different situations. The *hot-situations* are absent of stabilized (knowledge-based) identification of intermediaries and overflows, including the distribution of sources and target agents – the way effects are measured – it is not being possible to distinguish between production/dissemination of information/knowledge and the decision-making process. The *cold-situations* involve quick achievement of agreement, in which actors are identified, interests are stabilized, preferences can be expressed, and responsibilities are acknowledged and accepted. In this case, the environment is ready to negotiate.

The hot-situations are becoming omnipresent and invasive, including their source – information. However, hot-situations are difficult to cool down due to the lack of consensus between the description and development of the situation due to non-calculable definitions. This is leading to the negotiated market (relationship of identities, interests and existence) and hybrid forums (economic and social) trying to provide the combination of hot- and cold- situations to keep the market afloat (Callon, 1998).

However, the exchange is never defined by the market, but rather with human relations as an ideology (Miller, 2002). For instance, people hardly ever engage in the act of framing, but rather they are concerned about their sense of value, "which incorporates those on whose behalf they make purchases…, or the status relation to peers and career prospects within a firm for derivatives traders" (Miller, 2002, p. 232). Indeed, the framing of particular genres of exchange is required to protect other varieties of exchange between the exchange partners and also between consumers and commerce more generally; leading to the frame of a moral system of how the exchange is carried out.

Whether markets are defined by the relationship between people is not important for Mirowski (2007). But rather the markets are organized mechanisms of discrete mathematics and computer science, an autonomous algorithm that reacts according to its inputs, leading to unimaginable market designs that are performance tested. Consequently, the "markomata" theory is suggested as the mechanism design, zero-intelligence agent, "market microstructure", engineering economics and artificial intelligence. The laws that are sought under the new paradigm are laws of the markets, not laws of human nature, and the implication is that computers can decide as well as humans, if they have information on what is the best way to decide. However, this suffers the "structuration paradox" (Juniper, 2007). On the one hand we have engineers that are restricted/that restrict how technology is used, on the other hand we have the social component of engineers who "follow" what has been designed in the past and do not "kill" every social aspect with the application of technology. Hence certain social aspects survive in the future; imperatively a combination of both sides exists and evolves over time.

3.1.1.3. Economic value

With regard the E element, we pave the way with the concept of evolutionary economy as introduced by Schumpeter (1934, 1939, 1942); namely the economy:

- *is not stationary, but evolutionary with transformative dynamics.*
- *is strictly an adaptive process – no equilibrium – with interaction between entrepreneurs and routine-based incumbent firms.*
- *is influenced by changes of different sectors' evolution. Some changes are exogenous, while many affect the changes of the economy sector, including the opposite direction of causation feedbacks (evolves differently in time; asynchronous and highly intermediate).*

Economic value is in such economy also propagated through the diffusion of networks that follows the S-shape curve. In this case the growth of individual firms is influenced by feedback loops; complexity increases due to innovation and imitation (e.g. Andersen, 2012). Consequently, a multi-agent service relationship system of innovation networks across different sectors can be identified with the following variables, presented in Table 7.

Table 7: The variables of the Service Public Private Innovation Networks

Variable	*Description*
Mode of formation	Spontaneous and programmed/planned networks.
Mode of functioning	- top-down (vertical), and bottom-up (horizontal). - caretaker – actor is the conductor, hub or system integrator, and non-caretaker – responsibilities are diffused, distributed networks.
Life cycle	The networks are born, mature and may die.
The nature of the innovation that ServPPINs implement (e.g. typical innovation networks are technological)	
The nature of the main actors operating within the network (and their relationship).	

(Source: Gallouj et al., 2013)

The INs are replaced by important new forms of ServPPINs (Djellal & Gallouj, 2013), because they comprehend the dual side of innovation across different sectors. For instance, the traditional IN are limited to technological innovations of private sectors that are visible and have predictable innovation processes (e.g. structured R&D). In this case, the INs do not consider the non-technological innovation or the invisible innovations from the public sector, for example. Or innovations using combinations of complex innovation processes (both technological and non-technological) driven by the waves of top-down or bottom-up innovations across different sectors.

The ServPPINs leverage the power of collaboration between the private and public sectors. *They are not only considering the private sector, like INs, but also the collaboration across different sectors*. In addition, the importance of service providers in a network is recognized. For instance, the INs are focused on manufacturers that do not capture the interactivity of the service sector (e.g. banking, consultancy). Consequently, the servPPIN is a more open concept with regard to the understanding of innovation. Four types of ServPPINs, in increasing order of complexity, are identified:

i. simple – partnership between private/public sector for adoption of (complex) technology; requires large investment for joint organization of use, which may

give rise to non-technological innovations (e.g. organization or service innovation).

ii. *simple – various actors from different sectors in a network of co-production of technological innovation projects (such as adoption, including complex technologies; however, innovation is limited to some extent).*

iii. *simple – also various actors from different sectors in a network, but in a co-production of non-technological innovation projects (organizational, social, methodological) leading to (high) complexity due to intangible innovations (tacit knowledge/technologies) and involved actors; the relationship is difficult to formalize (e.g. in a contract).*

iv. *complex/architectural – combination of certain simple ServPPINs for implementation of an "organizational meta-change" at work (combination of most of the principles at work of simple networks) leading to complexity through interactions between different (emerging) forms of innovation experiences; posing many managerial problems due to interactions between different forms, and due to still-emerging forms.*

The dominant innovation process of servPPIN is as follows:

- *simple (i and ii) types of technological innovations are predominantly organized, planned innovation, leading to formalization of R&D structures that follows the sequential (stage-gate) process (e.g. Merlin & Moursli, 2009).*
- *simple (iii) types of non-technological innovations frequently adopt unplanned, emerging innovation models with local dynamics of informal innovation, such as bricolage, ad-hoc or rapid application models* (Fuglsang, 2010; Gallouj, 2002a; Toivonen, 2011).
- *complex/architectural (iv) types of innovation process consisting of contrary waves of bottom-up and top-down innovation that develop within (i, ii and iii) formal and informal models (Djellal & Gallouj, 2013).*

In the following table we provide the summary of the ServPPINs and their connection with the service innovation perspectives as presented in Chapter 2.

Table 8: Service Public Private Innovation Networks by degree of complexity

Type of innovation	Origin	Adoption	Production		Adoption/production
	Nature	Technological innovation	Technological innovation	Non-technological innovation	Complex, architectural innovation
Dominant type of innovation process		Planned innovation		Unplanned innovation	Planned/unplanned innovation
Type of ServPPIN		Adoption of technological innovation	Co-production of technological innovation	Co-production of non-technological innovation	Adoption/production of complex architectural innovation
Theoretical perspective		*Assimilation*		*Differentiation*	*Integration*

(Source: Djellal & Gallouj, 2013)

3.1.1.4. Notion of integrated social media interactions

Due to the value of communication, we see how information is crucial for the operation of our system. Indeed, the technology of SM enables communications, essentially new interactions with the (invisible) economical externalities and other interactions that are overflowing the frame – a combination of the "human" and "computational" interactions in the economy. However, our system also captures the SM interactions in networks with the "outside world" of sectorial co-evolution with the emphasized social interactions. We assume that ServPPINs, which narrow the gap of innovation duality across the public and private sector, also capture the social interactions or non-technological innovations in sectorial co-evolution with the SM. For instance, the ServPPINs remind us about the importance in knowledge production within hybrid networks of interconnections across different sectors between social interactions or the non-technological innovations of unplanned innovation processes of local dynamics. We assume that different complex modes of innovation processes across different sectors can be leveraged with the interactive innovation model.

3.1.2. Relationship between the elements

In this section we briefly describe the relationship between the elements of our system and identify their potential interaction with the SM. In general, we are seeking the

relationship of unmet interactions that are occurring on SM as a result of duality of innovation in services across different networks and sectors. In Chapter 1 we have seen how SM enable users to form invisible interactions that are becoming useful in several ways. For instance, actors can reduce certain social failures in daily lives. Such interactions are occurring also in digital economy; narrowing the gap of measuring (invisible) innovation in digital economies. Hence the relationship between the C, M and E elements is used to reveal the duality of innovation (cf. visible, simple, predictable vs. invisible, unplanned and complex innovations). On the one hand, we are surrounded with the conception and creation of (new) knowledge with SM. On the other hand, we are facing the economics of social production of knowledge in different contexts with a new interface of market-based businesses, namely social sharing and exchange as a modality of economic production – market- and social-relations hybrid (cf. Benkler, 2006). Such social production has particular dynamic with implication on increasing overall productivity in sectors where it is effective – changing the boundary of a firm – "taking those who used to be customers and turning them into participants" (ibid., p.125) in a process of co-production or co-creation and changing the relationship between the firm and its users.

3.1.2.1. Elements of the system and its attributes

In our system, *the relationship is recognized in the cause and effect* between the elements and their attributes in two possible states – C {c1, c2}, M {m1, m2}, E {e1, e2}. As we will see, the states of these elements are the most pertinent in service innovation and SM. In short, the *C element* leverages the attributes of the communicational value considered within the whole system with the inward reactions {c1}, while the outward reactions {c2} influence the sub-whole of the system. The *M element* leverages the attributes of the concept of framing and leaks, which as a results defines the size of investments required to frame the interactions and its overflows of cognitive resources/strategies shaped by previous experiences (Goffman, 1961; Callon, 1988). Firstly, the framing is the norm and interactions are the leaks {m1}. Secondly, the interactions are the norm, but then the framing is expensive and always imperfect and with marginal effect {m2}. The *E element* attributes are simple or complex ServPPINs types. The {e1} involves the adoption and/or co-production of technological innovations, while the {e2} reflects the co-production of non-technological innovations and/or organizational meta-change. Both attributes reveal the dominant innovation

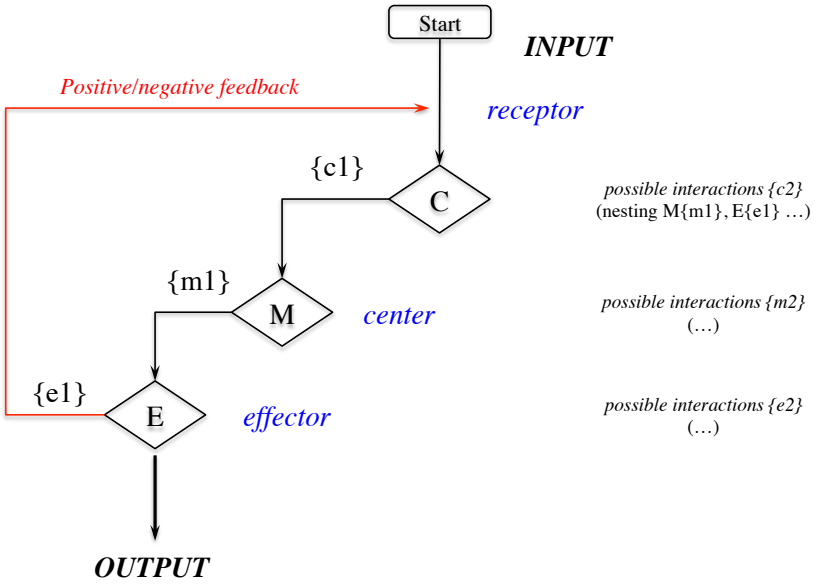
processes. For instance, the {e1} involves the planned innovation processes or structured R&D, while the {e2} involves the unplanned innovation processes, such as ad-hoc, bricolage and/or combination of the top-down and bottom-up innovations derived between the {e1} and {e2}.

3.1.2.2. Potential configuration of the system

According to our system, we can define different configurations. However, due to space constraints, we observe the essential configuration and reveal the SM interaction in the service innovation economy. In this case, we find that our system benefits from the novel and as yet discovered SM interactions in the conception or creation of (new) knowledge (cf. The interactional model of service innovation with the SM).

The potential configuration of the system is $S_p = (C, M, E)$. In this case, we begin with the decision with regard to the communicational value of the system (C). For instance, do we want our system to innovate within the structure and maintain its course, or do we want to engage in interaction with the external environment and respond in (a potentially) infinite regression of relevant contexts and change the code of the system? This is only the first element of the system and, as we will see, in our case it defines the behaviour of the whole system. However, in the next figure we illustrate the potential configuration with all the elements and their attributes.

Figure 13: The potential configuration



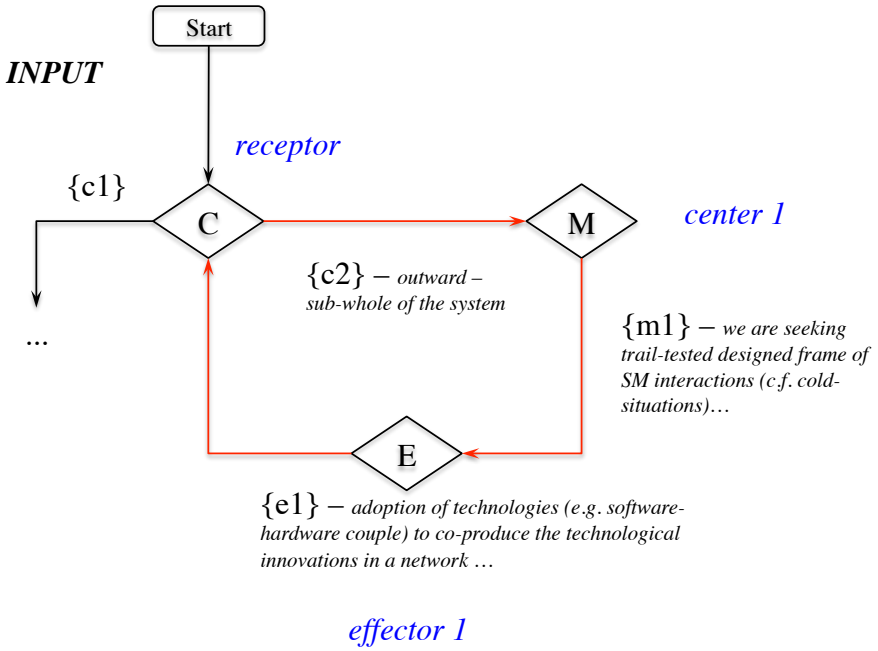
According to the above Figure 13, the potential configuration of the system has the following attributes S_p = (C{c1}, M{m1}, E{e1}). Consequently, we configure the initial trajectory and relationship between the elements and their attributes. We assume that the complete configuration is impossible due to unpredictable interactions in the environment. However, the owner of the system encodes the configuration, namely the trajectory of evolution the system will take. In this case, the trajectory equals C = receptor, M = center, and E = effector (back to C).

The above configuration encodes the system to adopt certain (complex) SM technology and co-produce the technological innovations. In other words, the system is seeking stabilization and organization within the structure. In this way it is maintaining the original code with the acknowledged frame. However, certain interactions are overflowing. Ideally, the overflows are captured with the trial-and-tested frame design with simple types of service innovations across different sectors as the effect of this configuration, until the desired effect (innovation) is obtained. Next we describe the potential configuration (S_p) in more detail.

Our system follows to the element C and its attribute {c1}. In this case, the system is seeking to self-stabilize and self-organize according to the encoded trajectory with the positive/negative feedback. In general, *the negative feedback signals that no change in the system's output is necessary; it allows it to remain constant within prevailing course of trajectory. On the other hand, the positive feedback signals a difference between the system's actual behaviour and its expected performance*. In this way it alters the operation until the system's behaviour is on target.

However, at this step of the system's trajectory, we can already leverage the possible interactions of service innovation with the SM for the conception or creation of (new) knowledge, products, processes, services, methods, systems and management of the projects concerned. For instance, the owner of the system can engage the active SM interactions and leverage new interactions in an additional causal-effect feedback loop. This is achieved with the imposition of a (simple) function of the nesting on the {c2}. In this case, the sub-whole of the system with(in) another (sub)system is influenced. In other words, another system is induced to influence the C element with the activity of that system (e.g. M{m1}, E{e1}), as presented in Figure 14.

Figure 14: Possible nesting of interactions



In addition, there is another, more complex than circular, function of nesting available. For the sake of explanation, someone could influence the sub-whole of the system and induce a system of a different combination of elements (e.g. E{e1}, M{m1}). In this case the position of the elements would be as follows: E as the center and M as the effector. In complex configurations, the number of elements will increase, as well as their hierarchy within the system. In a case when we are faced with many and complex loops of cause and effect across different hierarchical levels we distinguish between different systems. In our case we indicate this with a number next to the position of the element (i.e. center 1, effector 1), see Figure 14 where we unfold the possible nesting of interactions i.e. $S_1 = (C\{c2\}, M\{m1\}, E\{e1\})$.

Regarding the potential configuration of the system, after the C element follows the M element. In this case we are interested in how the system would behave with regard to the interactions. For instance, if the {m1} attribute of the M element is selected then a certain frame is considered. In Chapter 1 we have seen the example of how six dimensions are encompassed into the framework of SM interactions (See Table 1 on p. 19). However, no matter how we design the frame, the interactions will always overflow (due to a particular context) with a bearing on costs. Nonetheless, in this case certain actors are identified, interests are stabilized, preferences can be expressed, and responsibilities are acknowledged and accepted.

As can be seen from the above two figures 1 and 2, the M element is the center of the configuration. Needless to say, a different trajectory of the elements and its attributes (the system) will have a different effect and cause, since each relation between the elements is influenced by the positive and negative feedback, eventually at different hierarchical levels.

In the service innovation economy, leaks of interactions are evident in different phenomena. For example, the expensive acquisition of different SM companies, such as Instagram and WhatsApp, by Facebook (Olson, 2014). The users of either have (continuously) interacted in/across different contexts. In other words, the SM users have identified and stabilized interests elsewhere, namely displayed information about themselves or collected information about others. In Chapter 1 we have seen the extent of different interactions that occur with the SM at various levels of society, markets and companies/organization. For instance, the implication is that each businessperson has a SM strategy. Consequently, we assume that SM users will always seek the opportunity to interact elsewhere. However, this will depend on value to the user (e.g. jobs, knowledge…). See Chapter 1 with regard to the use of SM at different levels.

On the other side of the M element, the {m2} attribute enables other possible interactions, not considered within our potential configuration. In this case, we see how the evolution of certain SM followed the interactional service innovation. For instance, both Wikipedia and Twitter went through a change from the passive to the active environment. Wikipedia started out from the failed Nupedia, because Wikipedia offered its users an active environment (DiBona, Stone & Cooper, 2005). Another example is Twitter. This was a plan B arising from Odeo that had also failed (Carlson, 2011), because its product was based on a passive environment. The owners improved the product of Odeo with the characteristics of an active environment and created Twitter. In such cases, the framing is expensive and requires certain measurement devices (e.g. mobile phone, different SM designs/features). It may be challenging to distinguish between the production/dissemination of information/knowledge and the decision-making process in such situations. However, it is exactly this process that created the success from failure with Wikipedia and Twitter. Indeed, different (unseen) SM interactions can occur at work in society. See Chapter 1 for more about the SM interactions in society in general, and in the organization in particular.

We can further emphasize the effect of an active environment with regard to the C element. In this case, the attribute {c2} enables a change of the system's code and infinite regression of relevant contexts with active participation in the environment (change of the system's sub-whole). This phenomenon is leading towards the continuum between the co-production and co-creation relationship of the users' and employees' involvement and encounters as conceptualized with the UBSI concept (See 2.4. User-based service innovation with the social media on p. 88). Consequently, unseen interactions may occur.

However, with the M element, namely with the {m2} attribute, we seek how to capture the premature SM interactions. The typical case of interactional service innovation with the SM is the co-funding platform e.g. Kickstarter (Mollick, 2014). In this case, the framing is open to the interactions across different industries and sectors. Indeed, the framing of Kickstarter was an experiment that eventually captured possible interactions of service innovation with SM. However, if organizations wish to adopt such an interface today, then the costs will be considerable, and framing will be imperfect. Although certain initiatives of open data or "entrepreneurship government" are developing (see Chapter 1), we expect that certain interactions will escape/avoid the "premature" frames and find the interactions elsewhere, especially due to the paradox of framing. This implies creation of a new service innovation with SM, such as Kickstarter. Indeed, we have identified possible interactions that could be tackled with the interactional model of service innovation with SM. In this case, the SM involves interaction with the users in different relationships and innovation of different products/services encoded within the configuration of the system (following the trajectory).

According to our potential configuration, the trajectory subsequently follows the effect with regard to the service innovation types and their innovation processes, namely the E element. In case of the {e1} attribute, companies are aiming to adopt technology from elsewhere, which is not surprising with regard to SM availability. In Chapter 1 we saw the extent of SM in society. In addition, certain companies offer solutions to exploit the pool of certain SM functions linked in a modular way and provide a particular service (e.g. Piskorski & Johnson, 2012; Piskorski, 2006; Piskorski, Halaburda, & Smith, 2008). In this case, the companies are acquiring (complex) technology and enable the users to co-produce the technological innovation (providing solution information),

something like users of Twitter and Wikipedia can do. This is the most pertinent case with regard to SM. For instance, in Chapter 1 we have seen that around 30% of companies in the EU community used SM in 2013 to increase their profile (Giannakouris & Smihily, 2013). In this case, around 50% used SM to obtain customers' opinions, while around 30% used SM to involve customers in development of goods and services. Indeed, companies use SM for different reasons. See Chapter 1 for more statistics about SM, namely 1.4. Economic perspective on p. 37.

Regarding the co-production of technological innovation we can mention the case of Thingverse, Quirky, and Shapeways. This mainly involves digital design and sharing of information in different networks about the process of technological innovation in global development (Eppinger & Chitkara, 2006). On the one hand, this approach improved the R&D, because certain companies' manufacturing (processes) make the existing products more efficient, or even create products that were not possible in the past (e.g. GE, Boeing). For instance, such technological innovations are used for rapid prototyping or even final use in military or commercial aircraft parts (Bullis, 2013; Coburn, 2015; Dickey, 2013; Freedman, 2011).

On the other hand, such virtual design of product developments is disregarding the front-end where the needs and preferences of users are identified (Tucker, Fixson & Meyer, 2012). In addition, such design presents the major part of project costs, while it may also delay the completion. However, virtual designs emphasize the social product development through SM, namely the aspects of non-technological innovation (F. T. Piller, Vossen & Ihl, 2012). We assume that the users of different SM are revealing new network interactions in idea, development or production processes (e.g. bricolage, ad-hoc and rapid-application innovation models).

With the E element and its {e2} attribute, we can observe other possible interactions with SM. For instance, the {e2} involves the interactions beyond the {e1}, linked to the interactional service innovation with the SM. In this case the technological innovations can be supplemented with the non-technological innovations or even complex types of ServPPINs. These types of innovation can involve the unplanned innovation process with the SM interaction. For instance, in Chapter 1 we have seen how the SM enables centralization of different organizational activities, namely altering socialization, knowledge-sharing and power processes in organizations' future manipulation. We

assume that different complex ServPPIN types of top-down and bottom-up innovations may emerge from the regression of different types of contexts derived with SM.

3.1.3. Interactions characteristics of the system

The above configuration of the system is only one example. However, with this example we provide a general operation and certain interactional characteristics of the system and its elements with regard to SM and service innovation. For instance, with the C element we have observed that with the {c2} attribute the interactions at the sub-whole of the system with SM are possible. We took the same approach for the other two elements, namely M and E. With regard to the M element, we have observed that {m2} enables the integration of active interactions of the SM users with capturing premature overflows, for example. With regard to the E element we have observed that in case of {e2}, the interactions with the SM can be leveraged with non-technological and complex service innovation in regression of different contexts.

Each of our elements benefits from the interactions that also occur in SM. Consequently, our system goes beyond the concept of ServPPINs. For instance, the integration of the SM interactions reveals different contexts in the conception and creation of knowledge production and dissemination. Due to our system we are able to regress such interactions in an infinitive number of relevant contexts. Indeed, the users of SM already innovate across different sectors in today's service innovation economy. Therefore, we recognize the gap between SM interactions and interactions that occur in service innovation networks across different sectors.

Although certain interactional characteristics have been identified, we have not covered the conceptualization of the interactional service innovation with SM. Consequently we are limited in narrowing the gap of SM interactions that occur in service innovation networks across different sectors. For instance, in this case the users of SM can either be active or passive actors within the innovation process in service innovation networks. Such networks can be either simple or complex, or even a combination of both, with implications for the organization of a firm or even of a particular sector. In the next section of this chapter we focus on the conceptualization of the interactional service innovation with SM, namely we build the interactional model and suggest a theory.

3.2. The interactional model of service innovation with the social media

Due to incomplete representation of physical interactions with virtual interactions (Graham & MacKenzie, 1996) we assume that most interactions occur in physical environments. Nonetheless, such environments are influenced by SM interactions. On the one hand, the markets of service innovations networks across different sectors are perceived as social relationships – complex and unpredictable. On the other hand, they are seen as algorithm phenomena – very predictable. Either way, the users of SM interact due to certain social environments and "… display information about themselves or … collect information about others" (Piskorski, 2014, p. 250). Consequently, service innovation may be subjective, because it depends on the interactivity of value systems, which is subject to a technology driven by social construction at the current time and with tangible properties (e.g. Gallouj & Djellal, 2011; Lusch & Vargo, 2014). Needless to say, the customer, the user and other stakeholders have an impact on the relationship (performance) in service innovation.

According to the above systematic framework of service innovation networks across different sectors, we have observed SM interactions between the virtual and physical environments. In this case, we do not only seek to know how to acquire/retain certain users in the adoption of technology or co-production of information and produce value according to the organization's offering. But we also seek to know how organizations leverage non-technological innovation and complex meta-change with the omnipresence of SM in different social environments of the emerging economy (see Chapter 1). This is a subject of service innovations across different sectors, including the relationship of co-creation. In this case, organizations offer certain chain/node-of-value constellations to the user. Indeed, we go beyond social interactions, as observed in Chapter 1; we want in particular to meet the economic needs of the SM and service innovation with 1) the role of users' experience, and the 2) importance of elaborating information on users' needs into shared understanding with the provider's organization. The aim is to integrate the interactional service innovation with the SM user and leverage the 70% of employment and value added by today's economies service sector.

In regard the interaction, we consider the relationship of (interactional) co-production and co-creation (experience) of value (Prahalad & Ramaswamy, 2004; Ramirez, 1999) as explained in the Chapter 2. Accordingly, we conceptualize service innovation on the

continuum between the co-production and co-creation with key differences: (1) whether the communication with the users is intermittent or continuous; (2) whether the communication and involvement is user- or firm-driven; and (3) whether the value is created with production- or consumption-processes (Chathoth et al., 2013).

These key differences are in this study conceptualized as: (1) whether and to what extent the organization is using the SM for innovation passively or actively; (2) whether and to what extent the organization is using the information of the SM user in the innovation process; and (3) whether and to what extent the organization is using SM in the co-production and co-creation of value in service innovation. On basis of this conceptualization we define the interactional model of service innovation with the SM that encompasses the following dimensions: the approach to SM innovation, the innovation process with the user, and the interface between the service provider and user. Next we present the theories that are used to conceptualize these dimensions.

3.2.1. The approach to social media innovation

In Chapter 1 we have seen how are wide varieties of SM typologies (e.g. blogs, social networking sites, collaborative projects, etc.) emerging continuously with new and overlapping functionalities on the landscape of SM. This is a challenge for innovation, however, companies innovate with diverse SM activities. For example, *the honeycomb model* identifies the right user as key to innovation with SM (Kaplan & Haenlein, 2010). Or, *the continued interaction* between the user and an innovative organization is recognized as important in SM innovation (Füller et al., 2006). Recently, Helms et al. (2012) tackled the challenge of SM interaction with the user and leveraged the aforementioned activities into an SM innovation method to further structure the identification, access and interaction with online communities.

The above findings indicate that SM innovation activities or method may not be sufficient, because companies may have unique requirements for innovation with the SM. However, companies leverage the activities of SM actively and passively (Helms, Booij, & Spruit, 2012). The active approach differs from the passive in that in this case organizations set up a collaborative/participatory process with the public. Companies make use of each approach with particular strategies, which implies the activity of a user- and producer-relationship. Some examples of active strategies are i) community

engagement, ii) ideas competition, iii) interactive value creation, iv) participatory design, and v) product design.

i) *Community engagement* is the least active strategy; however, it may impact the innovation process by soliciting feedback from the public. In this way organizations can motivate users to share experiences, which consequently engages them with a brand (Parent, Plangger & Bal, 2011). The impact on ideas could be much greater with the ii) *idea competitions* that employ creativity in a specific timeframe and participation of the user groups (Leimeister, Huber, Bretschneider & Krcmar, 2009).

iii) *Interactive value creation* impacts ideas and innovation at the same time. This occurs when an organization broadcasts the problem to an unknown group of users with an open call for a solution that is oriented towards a specific task (Kleemann et al., 2008). The public participates in the whole development process or value chain and the innovation process is user-led rather than user-based. Essentially, companies are engaging individuals' power to gain mutual value.

iv) *Participatory design* is the next level of user and organization activity. Here the user and organization cooperate during the initial exploration, problem definition and the development or evaluation (Ramaswamy, 2010). This is on-going cooperation that supports the learning and development of knowledge and skills, but when a customer, not only an organization, needs something. The impact of cooperation on innovation is observed through the "producer-user innovation relationship". v) *Product design* is the most active strategy, where the consumers are producers – *prosumers* (Toffler, 1980; Parent et al., 2011). In this case the participation of the user and organization is most active.

Besides these active strategies, companies adopt different passive ones, such as i) *netnography* (Bartl, Hück, & Ruppert, 2009) or analysis of SM users' behaviour with the use of online market research techniques; primarily based on text discourse (Kozinets, 2002); ii) *user profiling* or gathering and constructing the demographic profile of a user (cf. Liu & Maes, 2005); iii) *content analysis* (O'Connor, Balasubramanyan, Routledge, & Smith, 2010) or gathering and analysing the actual content that SM users post with diverse techniques such as sentimental analysis, opinion mining, discovering the intent to purchase, trends and differences tracing, etc. Recently,

SM have been used to demonstrate how different passive strategies are automated with a promising rate of innovative users found (Tuarob & Tucker, 2014).

3.2.2. The innovation process with the user

The user is the driving force in the innovation process of services and includes an active/passive co-development with a person or an organization irrelevant to the sector, especially in the case of economic progression of value (Pine & Gilmore, 1999; Sundbo & Toivonen, 2011). Therefore, if a SM user is a person, then he or she can be a client, customer, consumer or citizen; if an organization, this can be a firm, public organization, association, etc.

The user can be the original source of innovation, a partner in the innovation process, or someone that further develops the launched novelty. The feedback is important and user information should include facts about the profile (individual with demographic vs. business with corporate), and sufficient behavioural information, or information about the development of the user relationship (Xu & Walton, 2005). In general, information gathered from the customers often includes weak signals about future developments (Rowley, 2002). However, customers have different roles in virtual environments, including provision of information as users in e-service interaction after the innovation launch (cf. Nambisan, 2002; Sundbo, 2008).

Many commercially important products or processes are innovated in the interaction with the user (von Hippel, 1988, 2005) and companies structure the provision of information into the front- and back-end of the innovation process (Piller, Ihl, & Vossen, 2010; von Hippel, 2005). At the *back-end*, companies provide different types of toolkits or interaction platforms with different mechanisms. These mechanisms are used to capture the solution information from the users who participate due to the characteristics of social exchange (idem.). In other words, this is the application of technology to transform customer needs into new products and services, and increase the effectiveness of the innovation process due to direct problem-solving activities.

The first type of technology is used for innovation and has unbound solution space. With this technology users can combine the producer's standard modules and components to create and experiment through trial-and-error processes (Franke & Piller, 2003; von Hippel, 2005). An example is the manufacturer's toolkits with necessary solution information such as programming languages and drawing software (von Hippel

& Katz, 2002). The organizations use the second type of technology for the co-design and customization in a bound solution space and range of the economic and technological capabilities (Franke & Schreier, 2010; Piller et al., 2010). However, it can be modified with the predefined modules, components and parameters. And users use this type of technology for product adoption and individualization. Examples are Lego Factory and Dell's product configurator.

At the *front-end,* companies strive to obtain information about preferences, needs, desires, satisfaction, motives, etc. of customers and users in the targeted market. This type of information increases the effectiveness of the innovation process activities and reduces the risk of failure. In addition, it involves a profound understanding and appreciation of customers' or users' requirements, operations and systems. Examples can be found in the automobile industry (BMW Customer Innovation Lab, Peugeot's design contest, Fiat Mio).

Companies use the Lead User concept (von Hippel, 1986, 1988) for the provision of need-and-solution information in the innovation process, and it has been found that users do not have the characteristics of competition or economic rivalry (Franke & Shah, 2003). Users provide information due to social exchange or intrinsic motivations (Harhoff, Henkel, & von Hippel, 2003; von Hippel & von Krogh, 2003) and companies are finding this concept more and more important for the utilization of information on a given innovation problem (Churchill, von Hippel, & Sonnack, 2009; Lilien, Morrison, Searls, Sonnack, & Hippel, 2002; Thomke & Von Hippel, 2002). Recently, users are found to be in aggregate approximately three times more efficient at developing product innovation than producers (Hienerth, von Hippel, & Jensen, 2014).

3.2.3. The interface between the service provider and user

While the users may be more efficient at product innovation than producers, the innovation with the SM user may not always be beneficial for the company or for cooperation. On the one hand, the continuous existence of new and overlapping SM functionalities is obstructing the innovation with the users. On the other hand, organizations seek to leverage interactive value formation with the SM user. Either way, companies capture the interaction in innovation between the organization and user with the interface concept.

The interface has in practice been used to help understand different organizations cooperating with relatively autonomous and independent interaction (Wren, 1967). Indeed, the organization must be able to cope with change and unanticipated events in innovation with the SM user. This is a particular organization-set studied within the network of its interactions with other organizations in its environment (Evan, 1971), leading to bound organizational structure and capabilities enhanced by the interface concept. For example, the "interface is created when people, organization, or systems must meet in support of one another… as they seek to cooperate to achieve some larger system objective." (Wren, 1967, p. 71).

In services, the interface is defined as "a function of interactive exchange of information and knowledge, and sometimes of cooperative implementation" (Gadrey & Gallouj, 1998, p. 5), and its properties enable innovation with the user in the landscape of SM. Firstly, it reflects the (inevitable) temporal component of the organization's interactive process at different stages. Secondly, it corresponds to a certain organization (structured or unstructured) of the internal work with either internal (producer) or external (user) actors. At the core this may have a strong or loose division of responsibilities. And, finally, the interface corresponds to the internal and external roles with different strengths and important power distribution.

Following Gadrey and Gallouj (1998), the organization of the interface in service innovation is composed of the analysis and implementation phase. The analysis is an autonomous process with internal jobbing. In this case the organization will analyse a (precisely) defined task with internal staff and minimum external interaction (except for internal supervision). If required, the organization may support internal jobbing with the external partner (firms, users, customers). In this case, the internal and external staff achieve as "sparring partners" in full interaction. Organizations leverage the analysis in the implementation phase, and this phase requires the jobbing and sparring functions of the organization to cooperate closely. To a certain degree the organization may make decisions with the external partners, but relative to the utilization of knowledge and skills, which is unusual.

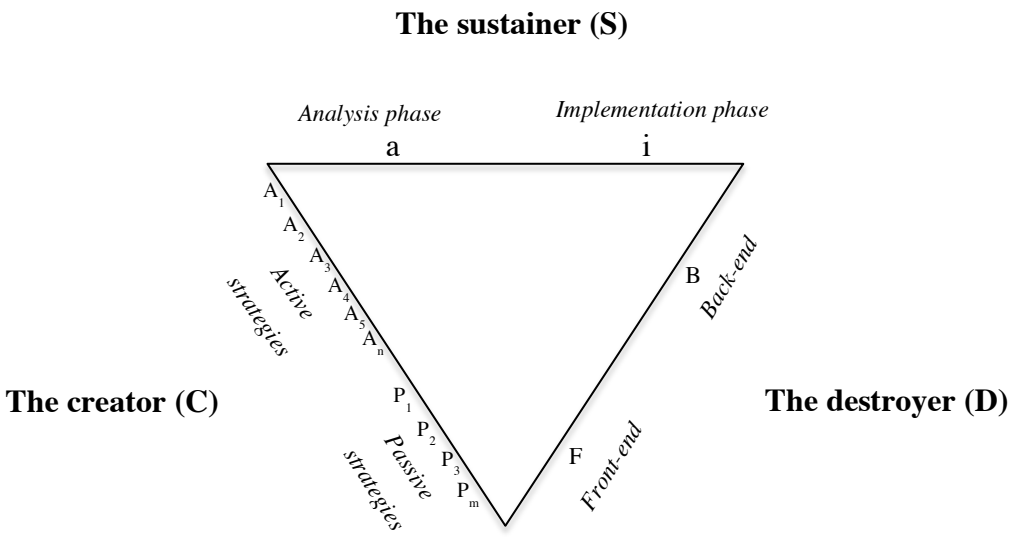
In addition, the interface is concurrently the locus and source of innovation (Gadrey & Gallouj, 1998). Firstly, the creation of an interface and its improvement constitutes a principal form of innovation in service provision. Secondly, the interface is a laboratory where innovation with the SM user is achieved. Finally, the interface is a substitute for

a product and process with an innovation typology that is based on the cognitive nature of knowledge. For example, Gadrey et al. (1998) identify three types of innovation: i) ad-hoc or the construction of a new solution with the customer; ii) (new) expertise-field, which detects an emergent field of knowledge to provide information; and iii) formalization, used for the implementation of the methods to better define a service.

3.2.4. Towards a theory of interactional service innovation with the social media users

The invoked theories enable the interaction between the SM user and organization based on information and knowledge. We argue that the dimensions of this theory are conceptually not dichotomous, but rather mutually dependent, and that the user generates information for the organization's innovation process. However, the information which the user generates is not always beneficial for the innovation. On the one hand, the user is superordinate to the organization. On the other hand, the organizations need to structure the information that the users generate. In any case, the organizations comprehend the innovation with the SM using the interface concept. In Figure 15 we present the interactional service innovation model with the SM.

Figure 15: The interactional model of service innovation with the social media



The above model and functions of its agents are the result of the integrated theories that we used to analyse how organizations use the SM in service innovation. In short, the function of the *creator* is to identify the approach for the creation of SM innovation. The function of the *destroyer* is to identify/elicit the information compatible with the SM in the innovation process. And the function of the *sustainer* is to align the *creator* and *destroyer* over time in a process consisting of different phases to leverage the co-production and/or co-creation in value formation with the SM during service innovation.

The *creator* acknowledges the creation of information by the user. It identifies whether companies and users participate in active and passive collaboration with the SM. In general, the active approach emphasizes the radical innovation or invention of completely new products or their categories, while the passive approach emphasizes the incremental innovation or improvements of existing products. Both are new to the market and firm that created them. This entails the relationship between the user and producer with changing innovation based on organizational structure and competences (e.g. Tushman & Anderson, 1986; Henderson, 1993).

On the one hand, organizations adopt the active approach and emphasize the user-innovation (user-driven) process of emerging organizational properties (bottom-up structure) that may destroy the organization's competences and lead to radical organizational innovation. Indeed, users are more likely to be a source of radical innovation, particularly when they have strong incentives to solve their needs. On the other hand, organizations adopt the passive approach and emphasize the producer-innovation (firm-driven) process that builds on existing organizational properties (top-down structure) and enhances the internal competences that lead to incremental innovations. Producer innovation is more likely to be a source of incremental innovation, particularly when producers focus on its capabilities to solve users' needs.

The organization and SM user collaborate actively in a range of different strategies, and each strategy involves a different degree of interaction and collaboration. For instance, while the collaboration in community engagement (A_1) is least active, idea competitions (A_2) are more active, and so on. Essentially, the active strategies emphasize a user-driven process. On the other hand, certain organizations would use passive strategies that do not seek active participation but rather information that users generate on SM

without interactive cooperation with the organization. Indeed, passive strategies emphasize a firm-driven process that is exclusively managed by the organization.

Due to economies of scope (Panzar & Willig, 1981) and "efficiencies of scope" in problem-solving (Hienerth et al., 2014) we assume that SM users are better than organizations at information generation. For instance, organizations may face emerging organizational properties due to a particular SM approach to innovation. Hence organizations need to comprehend the (active/passive) appropriation of information generated by SM users with the *destroyer* – D (B, F); B{0,1}, F{0,1}.

The information created by SM users is considered at the back- and front-end of the innovation process, and the function of the *destroyer* can be different for each product. For instance, companies seek the solution information for one product, D1 (B_1, F_0) and need information for the other, D2 (B_0, F_1), and so on. Whatever the case, at the back-end companies offer and engage SM users with interactive technologies and collect information about solutions by applying different modules, components, and parameters. These applied technologies can have a bound or unbound solution space, and companies may design custom interactions. One example is how SM are changing the health care industry through powerful and cost-effective communication, essentially reengineering the way doctors and patients interact (Hawn, 2009).

At the front-end, companies observe and collect information about novel products and services in person and with SM. Service companies acknowledge that SM enable enormous generation of information that they can use (e.g. IBM Big Data). For instance, SM have been found to be an important information source in online tourism (Xiang & Gretzel, 2010). In addition, SM are cost-effective in early exploration and ideation of product development; inspiring and meaningful activities for companies as well as for users (Kaasinen, Koskela-Huotari, Ikonen, Niemelä, & Näkki, 2012). Furthermore, SM are used to pool funds from friends (Piskorski, 2014). For instance, the eBay Group Gifts app leverages SM users (i.e. Facebook "likes") to find, recommend and buy a gift. Indeed, SM users generate information by increasing interaction in social exchange, and such information is considered ahead of market needs.

Companies achieve interactional service innovation with SM with the function of the *sustainer* (that leverages the *creator* and *destroyer*). In general, the function is sustainable, if and as the benefit derived from the information creation and identification or elicitation is equal to or higher than the costs of other ways of

generating (compatible) information in the innovation with SM over a longer period of time; defined by the company's available assets. For instance, the assorted assets allow the efficient and continuing functioning of the company's profitability over a longer time – growth of the firm (Penrose, 1995). Thus the interaction with the SM user is leveraged in the analysis and implementation phase of the organization.

The analysis phase enables organizations' production of the analysis and cooperation with the SM user internally and/or externally. However, this is mainly an autonomous process with little external interaction – company-centric. In other words, a "defined" exchange process. The example is when organizations use SM to find an embodied knowledge or utilize passive strategies in the innovation process. Although the analysis is autonomous, it may be required that the organization engages in cooperation with the external partner. In this case, the interaction in the analysis phase is intensive and (usually) follows the consideration of information and knowledge for further innovation with SM.

The implementation phase involves the most powerful relationship in the organization due to the close cooperation with the analysis phase and the potential cooperation with the SM user. When organizations engage in implementation with the SM user this is the consumption process – user (experience) centric. During the implementation, organizations maintain continuous interaction with SM and observe different information relevant to SM innovation. Ideally, they leverage the *creator* and *destroyer*, and implement the innovation with the SM user – C ($A_1 \ldots A_n$; $P_1 \ldots P_m$), D (F, B); F{0,1}, B{0,1}. Hence in the implementation phase, organizations may have mutual supervision and make decisions with the SM user relative to the utilization of skills and knowledge.

3.2.5. Conclusion

In the first part of this chapter we unfold the system with elements of communication, markets and dynamics of networks to capture interactions from physical and digital economy of service innovation networks across different sectors with SM. Consequently, we recognized the gap between the SM interactions and interactions that occur during service innovation networks. We narrowed the gap with the conceptualization of the interactional service innovation with the SM users. In this case we leverage the power of SM users in active and passive collaboration within the

innovation process in service innovation networks. Such networks are simple or complex, or even a combination of both with implications for the organization of a firm or even of a particular sector.

In the second part of this chapter we unfold the conceptualization of the interactional service innovation with the SM user. In this case we present three different underplaying dimensions of creation, destruction and sustainability of SM innovation. These dimensions are conceptualized with particular literature, such as approach to SM innovation, the innovation process, and the interface between the service provider and user. On basis of this literature we seek to embrace the interactions with the SM user in co-production and co-creation of value during service innovation. Essentially we developed a theory and model of interactional service innovation with the SM user. In the following chapter we seek the empirical validation of this model and theory.

4. SOCIAL MEDIA AND INTERACTIONAL INNOVATION: AN EXPLORATORY STUDY

The aim of this chapter is to evaluate the interactional service innovation with the SM. In previous chapter we have identify the gap between the SM interactions and interactions that occur in service innovation networks across different sectors. Consequently, we have conceptualized the interactional model of service innovation with the SM user, especially to narrow the gap with the further empirical evaluation. Basically, we tackle the empirical validation with the sequential explorative research design and apply the qualitative and quantitative research as explained in the introduction of this thesis. Accordingly, follows the qualitative empirical validation and reasoning of the findings for further empirical investigation.

This chapter is further disposed as follows. Firstly, we briefly touch upon the reason of using the qualitative research methodology. Secondly, we explain the qualitative methodology that we use, including the sample and procedure of data collection and analysis. Thirdly, we present the results of the qualitative study according to the functions of the interactional model that we have presented in Chapter 3, namely the creation, destruction and sustainability of service innovation with the SM user. Fourthly and finally, we summarize and present the results of the qualitative study. In this case, we reason service innovation with the SM with regard the quantitative empirical validation.

4.1. Research setting and methodology

In the first step of our research we apply the qualitative research methodology. This empirical validation is based on the methodology design according to the next qualitative methods: case studies, interviews, participant observation, and grounded theorizing. The designed methodology enabled us the research and collection of empirical data during a long-term span.

In general, we draw from the model of interactional service innovation with the SM that we have presented in Chapter 3. Accordingly, we have researched five companies and built a case study of each with the qualitative and quantitative data. These cases enabled us to observe the phenomena of SM for innovation in a company, validate the interactional model and develop the theory for further empirical validation.

4.1.1. Sample

The common denominator of all the companies is their daily use of SM for different needs. However, the researched companies differ with regard to the number of employees, SM likes and followers, turnover, country of operation, products and services and organization type. They employ between 30 and 871 people and have an estimated annual turnover of between 2 MIO and 170 MIO EUR, approximately. The majority of the companies have headquarters in the USA and UK, and the R&D departments are mostly based in Slovenia and North America. They have developed sales in North America, Asia, the Middle East and elsewhere.

In general, ICT has accelerated the use of SM around the globe. However, as we have seen in Chpater 2, it also facilitates service innovation (Barras, 1986) and the drop of ICT prices has further spurred investments into service (software) activities and construction of digital markets (Bryson, Daniels, & Warf, 2004). For example, all of the researched companies provide different services for digital markets (i.e. WEB). The economy of such markets is usually based on the "number of users and their activities", namely community members, Facebook *likes*, Twitter *followers*, downloaded mobile applications, and so on. In addition, they have developed software products with particular operations or functions to provide services to customers, namely users. In Table 9, next, we present a brief description of the companies that we used in our cases.

Table 9: Brief description of the companies

Company	*Core business*	*Turnover*[40]
1.	Crowdsourcing of 'simple' products. Lately, also providing products that integrate with mobile services (software). In the company's eyes, anyone can be the inventor.	Turnover: 16 MIO EUR Number of employees: 105
2.	Native content marketing for promotion of the content to users with a particular (software) product, either to bloggers (users) or big publishers (blogging and advertising services).	Turnover: 2 MIO EUR Number of employees: 30
3.	Previously a mobile application developer; today shifting towards building a brand – *animated characters* – like Disney, but on a smaller software-oriented scale.	Turnover: N/A Number of employees: N/A[41]
4.	A national bank that provides services to 1/3 of 2 MIO population market size, including the development of (software) products for the younger population and a mobile banking service.	Turnover: 170 MIO EUR Number of employees: 871
5.	Mobile advertising company with a particular (software) product for ad-engagement – a platform, a tool mostly used by media and creative agencies for (social media) mobile display advertising.	Turnover: N/A[42] Number of employees: 130

[40] The numbers are approximate for a year 2012/2013.

[41] The company is reluctant to share financial information. However, in 2011 it had 100 employees. In 2014, the number of downloaded applications was 2.3 billion and there were more than 240 million active users (i.e. interacting with a product or service on daily/weekly basis).

[42] The company is reluctant to share financial information. However, by the end of 2012 the company gained 1 billion ad-engagements impressions.

Our research began with the exploration of how does the organization with the highest number of SM likes and followers in our sample use the SM for innovation. For instance, the *company 1* is directly using the technology of Web 2.0 for social product development. By directly we mean, the core business of this company is driven by the inspiration that anybody can be the inventor. In this case, everyone that has an access to the Web 2.0 can use the company's platform and collaborate with the community and develop its own ideas. All of the company's employees have SM presence, including the company.

The aim of the *company 2* is to promote content to end user, either through bloggers, big publishers (via matching the users), readers, and viewers, especially with the "great" content. At the time of our research the company had two products to achieve this. The first product is appropriate for bloggers while they blog. In this case company would recommend the related articles, send images, and links the users can use, and participate as their post before publishing. The second product is content discovery network. In this case the company induces the "widget" for publishers where the content gets recommended to the readers automatically – distribution of content. All of the company's employees have SM profile, including the company.

The *company 3* was previously focused on developing "mobile" applications, while at the time of research they were transforming towards building a brand and other animated characters. All of their characters, products have certain SM profiles. The company and their customers use the profiles in regard the products. This company has a very large products' user-base, over 240 million of monthly active users. All of the company's employees have SM profile, including the company.

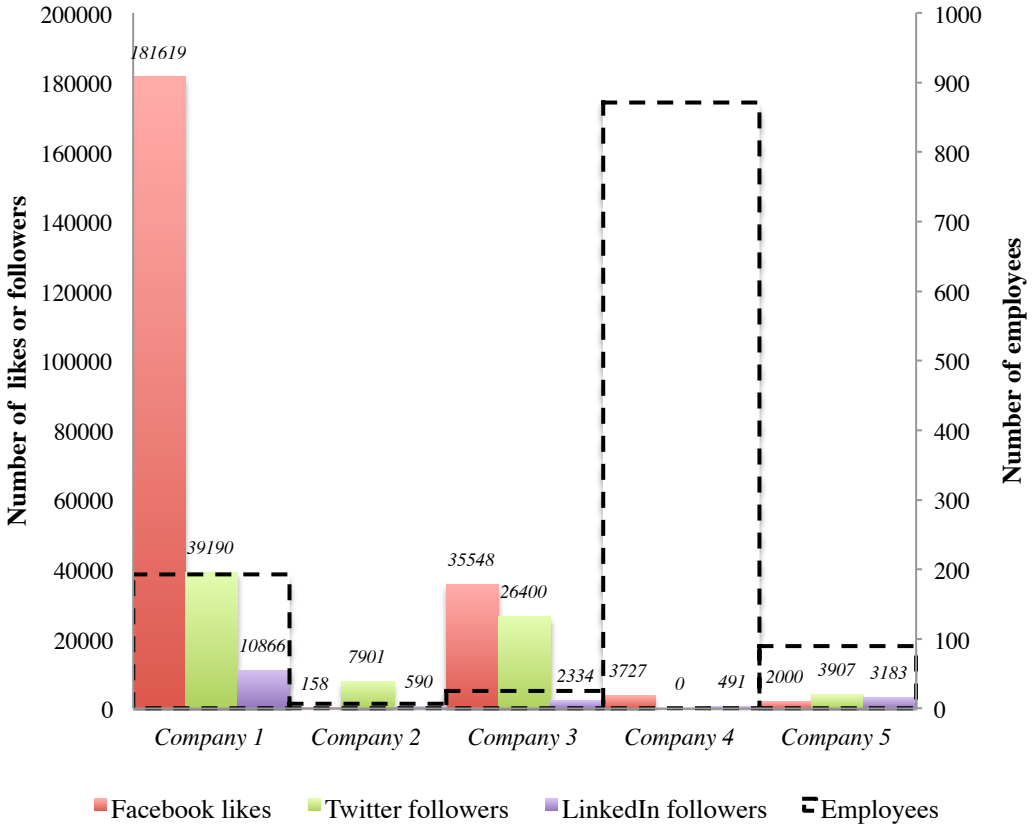
The *company 4* is a typical bank. It is offering loans and credits to retailers and corporations. However, the company as well provides other services either for public or private sector, such as factoring, leasing and asset management provided by its subsidiaries. Not all employees have SM profile. However, the company is present on SM and certain employees would rather use SM privately.

The *company 5* is a developer of advertising products for different mobile and stationary interaction devices. It provides a platform for interaction devices display advertising, which is tool mostly used by media and creative agencies. The tool allows the intermediaries to build the ads, mobile display ads, traffic them, and track their

performance. Essentially this is a versatile platform of different "display" advertising, creation, and tracking and management activities. All of the company's employees have SM profile, including the company.

In next Table 10 we provide the number of all the companies' Facebook likes, Twitter and LinkedIn followers, including the number of companies' employees. We can see that the number of employees is not proportional to the number of SM likes, followers, etc. Not surprisingly, we can as well see that the company 1, which is mostly involved in SM, has the highest number of SM likes and followers.

Table 10: The number of companies' social media likes, followers and employees



Note: Data from 2014.

4.1.2. The collection of data

The collection of data began with a selection of places to study the phenomena – cases. Different sampling strategies exist for how to reason and choose certain cases, namely where the data are being collected (Patton, 1990). It could be said that we have followed the sampling logic that revealed cases as "the rare opportunity of exploring the

relationship between the deep structure of an organization and [SM] implementation as well as expending our knowledge of that subject matter" (Silva & Hirschheim, 2007, p. 333) with a unique opportunity to access and study particular companies (Levina & Vaast, 2008). However, the selection of companies in this research followed certain criteria in decreasing order of priority: *access, use of SM, and service innovation*. In Table 11 we describe the criteria.

Table 11: Description of case criteria

Criteria	*Description*
Access	How well can the researcher access the organization? There was particular interest in physical access.
Awareness of SM	Which companies are involved in gathering information for innovation with SM? The interest was on companies that have interactive outpost on SM. However, there was also interest in the way companies use SM.
Service innovation	What service innovation specificities do companies employ? The interest was on how companies interactively approach innovation with SM, with particular attention to the interactional relationship with SM.

The selected companies were investigated on a requirement basis. In total, we conducted 12 "formal" and 30 "informal" exchanges of information with the companies' management (i.e. CTO, CMO, CEO and SM/Community Managers-CM) at the end of 2012 and throughout 2013. Certain companies were interviewed formally more than twice, while the scope of informal exchange of information followed the analysis of data. For instance, certain companies provided more information for one category, while others provided more information regarding another research category, and so on (cf. Table 13).

For the "formal" exchange of information, interviews were conducted face-to-face in companies' offices and usually the subject was agreed in advance. Due to the challenge of the interviewing bias, we relied on information from different firms and hierarchical levels (Graebner & Eisenhardt, 2004). When it was not possible to obtain data face-to-face, we used video conferences (i.e. Skype or Google Hangouts). Although some informants wanted to prepare for the interviews, the questions were not disclosed until the interview. Usually the interviews lasted for one hour. However, at the beginning of

the interviews, certain questions spurred new investigations/meetings that prolonged the interviews, produced additional data and led to further successful information observation. The interviews were mostly conducted on a weekly/monthly basis; however, the frequency was dependent on the company's available time. All of the interviews were recorded and transcribed as soon as possible for (potential) research integration.

The "informal" exchange of information with companies was mainly conducted via electronic communication that did not need to be transcribed, such as email. In addition, we gathered empirical data through participant observation, field notes, websites, blogs, and social interactions. Regarding the social interactions we participated in relevant events, conferences, and companies' development meetings, which involved observation of certain innovation process. For example, we observed lead-user tests in the development process of innovation with SM.

Although the collection of data was diverse, the interviews illuminated the investigation and the involvement of the researcher was imperative (cf. Sanday, 1979). However, we stood detached from the object of inquiry in order to minimize observation interference. The process of data collection was mainly based on the co-construction of narratives from lived experience. During this process we were asking open-ended, semi-structured questions, avoiding interruptions and encouraging exemplification, including providing information with enough space to supply extended accounts of experiences through time (Holstein & Gubrium, 1995; Gudmundsdottir, 1996).

4.1.3. The analysis of data

In general, the analysis of data proceeded through two cycles of "careful interpretation and reflection" (Alvesson & Sköldberg, 2009, p. 9). Firstly, we attempted to investigate the use of SM in the organization, namely the interplay between the user and organization regarding innovation and information. This was led by the emergence of collective and open-ended fields of meaning (Taylor, 1985). Afterwards, this became the field of engagement due to more precise definition and selection of ground theories. While going through this process, we realized that the dual enquiry of the investigation between the user and organization in terms of SM unfolded as an important finding about how organizations innovate with SM – use of information within and outside the

organization. Eventually, the collection and analysis of data resolved in cycling the research themes as given in Table 12.

Table 12: Research themes

First cycle	*Theme 1: The general importance of social media*
	Usually started with understanding *'How much time the organizations devote to communicating or following users on SM'*. This theme helped to observe the organizational awareness of SM. Namely, the organizations here signalled the importance of SM that spurred other investigation and analysis of information, such as *'Which type of SM is used?'*, and *'Why is a certain type of SM used?'*, and so on.
	Theme 2: The importance of information on social media
	Resolved around the question *'What types of information organizations usually get?', 'How is this information used for new product development?'* The 'ground theory' stressed the importance of information and knowledge accumulation during the innovation. Therefore, in this theme the attention was on how companies are learning with SM, and on the possible transformations due to the use of SM.
Second cycle	*Theme 3: The processing of social media information within the organization*
	Resolved around the investigation of *'How do (new) product development employees view information obtained via SM (given the market collects it)?'* This theme enabled us to investigate the ways that companies process information inside the organization, especially when and where SM is used.
	Theme 4: The processing of social media information outside the organization
	Resolved around investigations such as *'How do employees interact with customers/users on SM?'* With this theme we were interested in the ways companies gather information in the innovation process. This theme enabled us to investigate the ways companies process information with SM outside organizations.

The analysis process required utilization of induction, deduction, abduction, synthesis, evaluation, and logical and critical thinking. However, it was a particularly open, axial, and (non)hierarchical process of thematic and manual coding, before, during and after the information exchange with the companies (Saldaña, 2012). This process of data analysis followed triangulation of different sources and resulted in categories that were identified with the constructs in our research field. In Table 13 we summarize the process of data analysis.

The analysis started with the company that was most promising in terms of SM (cf. Table 10). Such an approach may be good enough for rigorous research (e.g. Lee &

Baskerville, 2003). However, this did not allow us to compare how other companies use SM during service innovation. We gradually expanded the research with the investigation of more companies and the final research design featured five cases. On the one hand, there is no ideal number of cases. On the other hand, a number between 4 and 10 works well (cf. Eisenhardt, 1989). In this way we increased the degrees of freedom and thus a rigor of positivist case study and wider research perspective (Lee, 1989; Orlikowski, 1993).

Table 13: Summary of data analysis

Stage of analysis / *Source of analysis*	*Before* (end of 2012)	*During* (during 2013)	*After* (end of 2013)
Cases (companies)	1	2, 3, 4	5
Codes[43]	8	13	16 (25)[44]
Categories (SM innovation)	*creation*	*destruction*, *sustainability*	
Constructs[45] (from particular to general)	8	6	3

Research from multiple cases is typically more robust and generalizable than single case research. However, we faced more complex theoretical sampling due to replication, extension of theory, contrary replication, and elimination of alternative explanation (Yin, 2008). In any case, the construction of multiple cases helped us to select the theoretical constructs with the abduction type of inference and verification through recognizing patterns of relationship among constructs within and across cases underlined by logical arguments (Eisenhardt, 1989).

Towards the end of data analysis we approached the practical assessment with the quality and rigor of an emerging model. This was achieved with "a combination of the empirical limits of the data, the integration and density of the theory[, and our] theoretical sensitivity" (Glaser & Strauss, 1967, p. 62). It involved formation of many

[43] Aggregate numbers.
[44] Although we have gathered plenty of new codes, the idea of expanding the investigation with more companies was to condense the amount of information, namely the number of codes (cf. Saldaña, 2012)
[45] Aggregate numbers.

different explorative hypotheses and "an interplay between induction and deduction (as in all science)" (Strauss & Corbin, 1998, p. 137). Consequently, we reached the redundancy of information and the confirmation of existing conceptual categories, which signalled the saturation of data collection and analysis (ibid.).

4.2. Results of the exploratory study

In the following subsections we present the results and findings according to the researched companies and conceptualized model given in Chapter 3. We use the model and functions of its agents to analyse how companies interact in service innovation with SM users.

4.2.1. Creation of social media innovation

Four out of the five companies we investigated participate in SM actively. *The examples of active strategies* that most stand out are community engagement (A_1), participatory design (A_4), and interactive value creation (A_3), respectively. Interestingly, the idea competitions (A_2) and product design (A_5) seem to be not that important for the researched companies. The example of community engagement (A_1) seems to be the most important. In this case, the SM user is a member of the community and is sharing participation with other (potential) members. This can be anybody; *"a buyer or a seller of the product, company's employee or somebody who is influencing the [innovation] process (e.g. voting, sharing ideas)."* (Community Manager, Company 1)

The community is used for soliciting feedback from the members. An example is when the SM users are motivated to engage with the brand and share experiences. In this case, each year a young generation of customers (SM users) engage with a company's SM profile and share that they will be queuing next door for public transport tickets. The company's organization responds by using the SM to manage the relationship. Other examples are when the SM users are motivated to participate by identifying particular characteristics of existing products, or when they *validate* the content that was previously used in advertising campaigns. Community engagement (A_1) may lead to the example of participatory design (A_4) strategy. In this case, the SM users engage with a community and reveal a need, which is an example of participatory design, but limited due to the destruction of the SM innovation, as we will see.

A good example of the participatory design (A_4) is when a product has its own SM profile, and this is where companies interact with the users of SM. Although the interaction is mainly for motivating the users to share experiences, organizations also drive the engagement of users with products due to virtual content that appears only on a particular strand of SM. The least used example of the active strategy is the interactive value creation (A_3). This occurs when SM users interact with an ad for a particular product and customize its characteristics in certain ways. In this case, the SM user is to a certain extent *creating* the ad, which he or she afterwards shares with other SM users, as the "customized product". In other words, the company is leveraging the power of SM user to gain mutual value.

All companies in the sample participate in the SM passively. The examples of the passive strategies that most stand out are the content analysis (P_3), user profiling (P_2) and community observation (P_1), respectively. Such examples are usually applied individually or in a combination. For instance, while most of the companies are focused on a particular strategy, certain companies have a combination of all three strategies. Either way, the passive participation resolves in two ways. On the one hand, the passive strategy is used for supporting the community; it appears to be minimal. For instance, a manager of a community with one million members explains that "*SM is more about posting than cleaning information*" (Company 1). On the other hand, some examples of passive strategies are used a lot, namely for user profiling (P_2) and content analysis (P_3) (Chief Technology Officer, Company 2, 3).

Furthermore, the organizations daily support the passive strategies with the available SM functions (vanity searches, social graphs, for example), and a custom measurement matrix. The "social graph" is (explicitly) used to construct a fairly complete socially connected network with the structural network characteristics/facts like average connectivity of high influence on SM, while the "vanity searches" enable companies to observe users', managers', etc. profiles on SM. Basically, the combination of the SM functions and the custom matrix are used to support the content analysis (P_3), especially to observe the customer insight. In this way, the companies integrate the passive strategies and observe how users and customers are using the product.

Active/passive strategies are usually leveraged with certain SM activities that organizations select or design according to a particular innovation task. However, the approach that organizations choose for the collaboration with SM is challenging for the

organizational structure due to enhanced/destroyed competences. For instance, the companies are usually simultaneously interacting (actively/passively) with SM and observing the emerging information about their products and services. In this case, they are faced with bound organizational capabilities to capture certain information, and seek how to leverage the (compatible) information of the *creator* with the *destroyer*.

4.2.2. Destruction of social media innovation

Three out of the five researched organizations do not believe that customers or users *"know what they want until they see it"* (CTO, Company 2, 3, 5). On the one hand, the organizations elicit information created by the SM user. On the other hand (consequently) they destroy incompatible information with their innovation processes. Either way, they are more or less following the provision of information in the innovation process with the Lead User concept; information is structured into the front- and back-end. When the organizations supplement this process with SM they reduce the diseconomies of scope with a different level of SM innovation (destruction of incompatible information).

At the *back-end*, the information is captured with a custom technology that has a bound solution space. The technology is used in several ways and the process is *hidden* from the SM user. However, the technology can be used to capture information with a product and SM. For example, consumers are using products along with SM and certain companies are measuring this with the mechanisms offered by the SM or a self-developed technology. The used technology mirrors the components and modules of the (intermediating) product, which certain of the companies integrated with the SM. *"We are just leveraging SM features"* (CTO, Company 5). This is an example of the reduced diseconomies of scope with *a low level of SM innovation (a high level of information destruction).* For example, the solution space does not allow much utilization of the potential (unique) SM innovation activities. However, some of the companies developed and improved the product characteristics due to the provision of information in the front-end of the innovation process.

At the *front-end,* the organizations observe how the users are using the product. For instance, the New Product Development (NPD) team is engaging users with the product (features) to capture the need (or solution) information. The NPD team records several observations for further discussions with the clients, listening to the users' ideas, and so

on. This process occurs very much in person and is mainly *hidden* from the SM user. On the other hand, the organizations engage with the users by asking questions on SM and test the information that SM users provide about their needs, or invite them to participate as lead users. *"In the past we needed to organize focus groups, interviews, research methods, etc. Now with [SM] this is here for free. Users are willing to share with and for us. It's much easier"* (CMO, Company 4). The SM users can mainly *see* these processes. However, regardless of solid engagement with the SM user to reduce the diseconomies of scope, this is *a medium level of SM innovation (and information destruction)*. For example, the SM user is rarely engaged into the front-end via (unique) SM activities, but rather with the (publicly) available SM. Indeed, these technologies' solution space is incompatible with the companies' innovation.

To further reduce the diseconomies of scope, certain companies curate the innovation process with the community. The community members engage via different interactive technologies that have a bound solution space, and the SM users can to a certain extent *see* the information at the front- or back-end. Although the community members curate the process, it is the company that evaluates the process-product. Thus, this is a limited participatory design or C (A_4) that is exemplified with *a high level of SM innovation (a low level of information destruction)* and (unique) SM activities. For instance, this is mainly the user-driven community process; the SM users follow, vote for, share, etc. what the company is innovating, namely updates for product launches, new project phases, brainstorming or evaluation meetings, weekly live events, etc.

While the SM are not much involved in the innovation process, they enable the provision of information when their users "like and follow" the products and services or participate as lead users. Indeed, this is a subject of the front-end and the emphasis is not on what SM users say, but how they behave. However, some organizations would also cross-compare the information at both ends to achieve more accurate problem identifications/predictions when the NPD team is improving the existing products or creating new ones. This is a challenge for the internally developed product ideas due to the observation of the information that SM users generate.

Although the destruction of information in SM innovation is mainly a firm-driven process, the innovation process with the SM user also reveals a user-driven process. In any case, both challenge the participation of the SM user in general, and the importance of sustainable SM innovation in the organization in particular. According to the model

of interactional service innovation with the SM users, organizations use the *sustainer* to leverage the function of the *creator* and *destroyer*.

4.2.3. Sustainability of social media innovation

The purpose of the *sustainer's* function is to leverage the opposing sides of exchange. On the one side, the *creator* and *destroyer* are driven by the social exchange. On the other side, the *sustainer* is driven by the economic exchange. This is characterized by the interaction between the SM user and the organization. Indeed, all of the organizations in our sample interact with the SM user, leverage the social exchange (of information) and reduce the costs of service innovation.

Four out of our five researched companies interact with a bigger number of users of existing products than they can interact with SM users. Consequently, certain of them do not pay much attention to SM innovation. However, they are sustaining interactions with SM and as a result have increased engagement with products, and improved their R&D and sales.

The company in our sample with the most active users explains that a large proportion of its revenues are based on interactivity with the users of its products. *"If a particular market would shrink, the company would have to invest in the development of interactivity in a different, bigger market and sustain the revenues there"* (CTO, Company 3). Indeed, the company's revenues are dependent on interactivity with a user of their products in a particular market, and certain of our companies also leverage interactivity with SM for product development. In this case, the SM user would communicate with a product, while organizations would diffuse information about new/existing products in the community via SM. However, the researched companies interact with SM in a specific way.

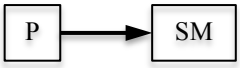
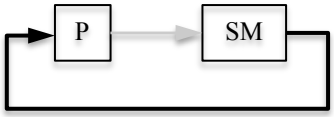
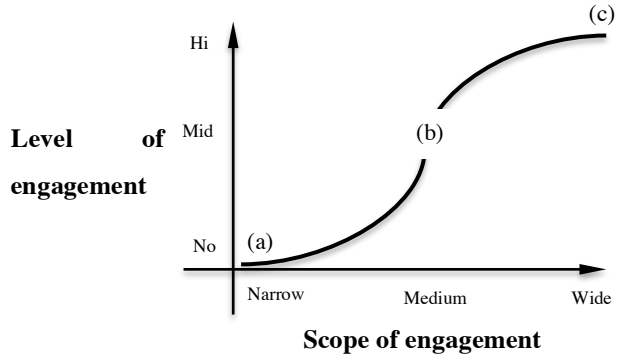
In the analysis phase, all of the organizations in the sample have a defined innovation task, and cooperation with the external partner is marginal. For example, the SM may not always be beneficial for product development due to particular cooperation between the organization and an external partner (i.e. community management); the organization did not find it useful due to the SM specifics. In addition, certain organizations mediate the SM interactions with a product. Consequently, the analysis involves several different specifics with regard to use of SM. In table 12 we present different SM specifics of the analysis phase for product development and organization.

Table 14: The social media specifics of the analysis phase

Product development
(a) Change of product specification (yes/no) (b) Identification of information compatibility (yes/no) (c) Intermediation of the product (yes/no)
Organization
(a) Constant (open) observation of information on social media (yes/no) (b) Social media information is subject to internal discussion (yes/no) (c) Social media information is aligned with the structure of the organization (yes/no)

The researched companies and their organizations mostly interact in the implementation phase, and all of the organizations in this phase use SM regularly. However, the majority of the organizations researched made decisions according to the analysis phase. Indeed, they have little mutual supervision with the SM user in the implementation phase. In spite of this, we have identified certain SM specifics for engagement with the SM user. In table 13 we present different types of engagements and their dynamics in the implementation phase.

Table 15: The social media specifics of the implementation phase

The types of engagements		
 (a) *The opportunistic* (narrow scope with no engagement) or no definition of (e.g. product) engagement with the social media.	 (b) *The inside-out* (medium scope and level of engagement that is mainly driven by the economic exchange) or e.g. social media-push for the diffusion of information with regard to the existing products.	 (c) *The outside-in* (wide scope and high level of engagement mainly driven by social exchange) or e.g. intermediated social media engagement with a product.
P = product, SM = social media		
The dynamic of engagements		
	Once the organizations achieve the medium scope and level of engagement (b), the effect of viral process may occur, e.g. the engagement may tip towards the outside-in engagement (c). Usually, the dynamic of engagement follows the S-curve due to the processing of knowledge and information in SM learning environments with the user-learning phenomena.	

The organizations are sustaining implementation of SM innovation with different strategies. For example, the implementation phase is on the one hand *close* to the engagement with the SM user and follows the SM specifics of the analysis phase (e.g. product specifications do not allow the external change). On the other hand, the implementation phase is *open* to external engagement with the SM user and follows the product development SM specifics of the analysis and/or implementation phase; e.g. (iii) outside-in engagement. The SM specifics in our sample follow the analysis and certain of them also persist in the implementation phase. Sometimes they are part of the organization's SM policy. Whatever the case, the analysis and implementation phases influence the relationship with the SM user in value formation. For instance, the organizations in our sample have homogenous behaviour with regard to the relationship with the SM user in both phases.

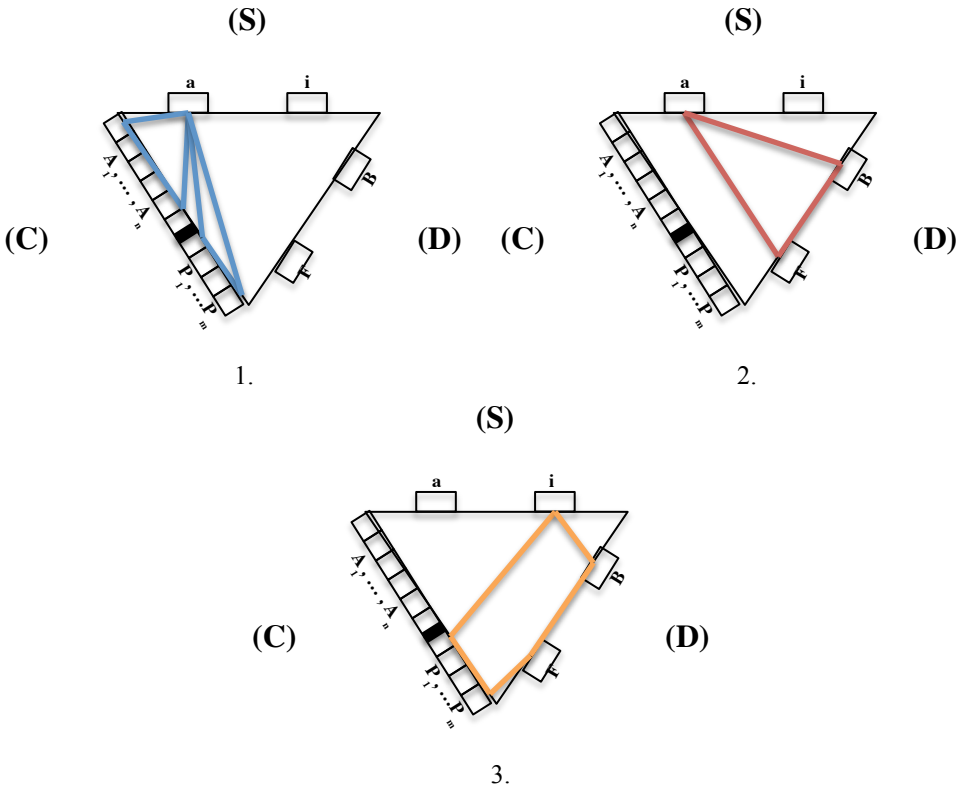
With the analysis phase, the companies *mainly* yield the co-production of value to the SM user; this is defined with the following steps. Firstly, the organizations define the *creator* with SM activities to leverage the active and passive approach of SM innovation and seek particular information from the user, namely C ($A_1 \ldots A_n$; $P_1 \ldots P_m$). Secondly, the organizations elicit the compatible information with regard to SM innovation activities for a particular product, namely D (F, B); F{0,1}, B{0,1}. And, finally, the organizations seek the function of the *sustainer* in relation to the *creator* and *destroyer*, and offer a potential value of innovation.

A good example in our sample is when the organizations leveraged the SM user, observed the information in a community and identified particular characteristics of products. In this case, the organizations leveraged the compatible information according to the organizational capabilities and user/producer relationship. Essentially, they implemented the value according to the firm-driven analysis with a passive approach to SM and offered the value of a new product for the customer that is optional – co-production. However, according to our model the organizations can also leverage the active approach in the analysis phase.

In figure 16, we present the example of co-production with SM. As can be seen in the third example of this figure, the organizations not only co-produce value in the analysis, but also in the implementation phase; with the passive approach and a certain level of SM innovation (information destruction). Hence the co-production of value is also an essential characteristic of service innovation with SM. This process has implications for

the organizational structure, competences and user/producer relationship, including on the SM specifics. And this phase is fully interactive when the organizations consider the accumulation of information and knowledge for implementation.

Figure 16: The example of co-production of value with social media

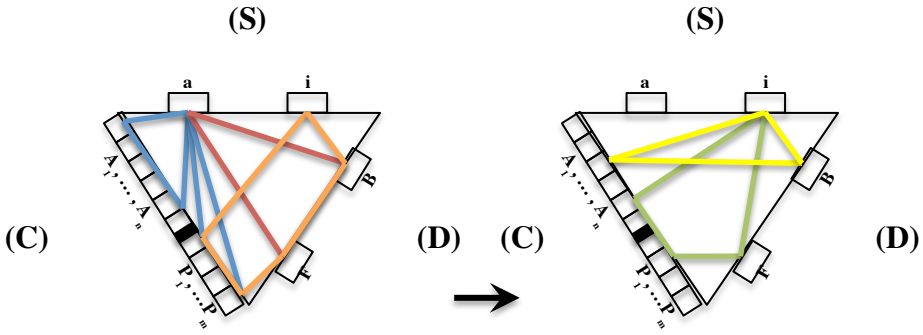


With the implementation phase, the companies *mainly* yield the co-creation of value to the SM user. In this case, the organizations maintain the continuous interaction with the co-production and SM user. Consequently, the organizations are able to observe and implement (unique) SM activities. However, they can consider and implement our recent example of co-production and move to the co-creation (experience) with the SM user as a way to gain competitive advantage. A good example is when certain organizations have collaborated with the SM user – C (A_1) – and driven the engagement, supported the sales or engaged new (potential) members of the community that were following other members on SM. *"Community members are not necessarily people that buy products... [for instance,] if my friend is following [the company] on Facebook, Twitter I may be interested in seeing what this is about"* (CM, Company 1).

In figure 17, we present how organizations move from the co-production to the co-creation of value with SM. On the one hand, SM are not much used in the innovation

process. On the other hand, certain organizations interact with the SM user and co-create value. For example, certain of our researched organizations implemented the active approach to SM innovation, such as the community management (A_1) and interactive value creation (A_3), and improved the engagement of the community with particular SM activities, such as the diffusion of information with regard to the innovation process stages among the community members.

Figure 17: From the example of co-production to the example of co-creation of value with social media



To a certain degree the implementation may involve mutual supervision of the SM user, with whom organizations also make decisions in relation to available knowledge and skills. However, in our cases we have not found such evidence. Taken together, the companies marginally co-create value with the SM user in the implementation phase. The description of service innovation above is an example of how organizations co-produce and co-create value with the SM user. In Figure 17, each (coloured) triangle is an example of a potential innovation of a different product. Indeed, co-production follows the information appropriation in co-creation as a result of the sustainer's function to gain competitive advantage. Hence, the co-creation of value with the SM user is marginal. In any case, organizations have a different function between the *creator* and *destroyer*; different implications for the organizational structure (capabilities) and the user/producer relationship. This is a way to optimize the shift between co-production and co-creation.

The *sustainer* enables organizations to achieve interactional service innovation (typology) with the cognitive nature of knowledge due to mutual learning through SM, including participation in different relationships. Indeed, with the functions of the *sustainer* it is possible to maintain a sustainable relationship during service innovation

involving the *creator* and *destroyer*. However, no matter how much this process is sustained it may eventually lead to "creative destruction" (Schumpeter, 1934). In other words, companies may face the evolution of an open-ended process that combines innovation, behavioural inertia and selection by a phase in which selection (or adaptation) dominates.

4.3. Discussion

What did we learn about the interactional service innovation with the SM user? We learned that users of SM are part of service innovation. We have observed this from three mutually dependent dimensions. In this case we see that innovation with users is leading companies to creation and destruction of particular SM innovations. The functionality of these sides is maintained with the sustainable SM innovation, namely we see how companies are reducing diseconomies of scope and R&D costs or improve sales, including seek innovation with SM. However, companies are involving users in a particular relationship, which enables them to leverage service innovation differently. With regard to SM and service innovation we see that co-production is still the most successful relationship. However, the relationship of co-creation (experience) with the SM user is not ignored.

We will revisit the underlying three dimensions and briefly explain their purpose. The first dimension enabled us to analyse the approach to SM innovation. Due to the properties of social exchange (and intrinsic motivations) the user of SM may provide the need-and-solution information. This is subject of the second dimension that is used to consider such information at the front- and back-end of the innovation process. Finally, the third dimension is used to observe how companies interact with the SM in the analysis and implementation phase of the organization (co-production and co-creation of value with the SM user). Needless to say, in this chapter we have derived the results with regard to these dimensions.

In general, the results reveal that companies approach SM innovation actively and passively, usually in a combination of different examples of strategies. On the one hand, the provision of information in the innovation process is not where SM are mostly used. On the other hand, the use of SM in the innovation process results in a reduction of diseconomies of scope. Either way, the interactivity between the SM user and organization is not always beneficial for the innovation. We find that organizations

adopt certain SM specifics; leading to different (SM) relationships and sustainability of SM innovation. Next we observe the results more thoroughly.

Firstly, according to the sustainability of SM innovation we can observe that the participation of the user and organization in SM is positively associated with the companies' service innovation. For instance, we found that companies are reducing costs and improving R&D activities with the SM. In this case, the use of SM in the innovation process results in reduction of diseconomies of scope with a different degree of SM innovation. However, we have also seen that the use of SM is challenging for the organizations. For instance, organizations defend the innovation processes with the elicitation of certain SM innovation. The example is when (internally) developed products are challenged in the organization due to the observation of information with SM. In this case, we find that the SM user may be more useful for information provision in the front-end of the innovation process, while companies elicit SM innovation with regard to their (SM innovation) capabilities. However, this is subject of increased SM interaction that we observe next.

Secondly, all of the companies in our sample interact with the user of SM to increase the engagement with a product or service. For instance, certain company state that their products are dependent on the interactivity with the users, while other claim how SM enables better understanding of customer needs for the organization. In this case, we can reason that increased interaction with the SM is positively associated with the organization and company (cf. Table 10 in this chapter). However, we find that the cooperation and mutual supervision with the SM user (external partner) is marginal. For instance, the interactivity between the SM user and organization is not always beneficial for the innovation. *In this case, we propose that the exchange and consumption process of information with the SM is associated with the analysis and implementation phase of the organization*. However, we find that organizations adopt certain SM specifics to comprehend such processes within the organization. For instance, the analysis phase of the organization entails certain specifics for product development and organization, while the implementation phase involves different types and dynamic of engagement with the SM. In this case, companies establish certain relationship with the user of SM that is leading us to the next results.

Thirdly, the invoked theory and model of interactional service innovation with the SM as presented in Chapter 3 enabled us to explain how companies co-produce and co-

create value with the SM user. In this chapter we find that the companies mainly yield the co-production of value with the SM in the analysis phase of the organization, while in the implementation phase they mainly yield the co-creation of value. Although the companies are supposed to gain competitive advantage with the co-creation of value (Chathoth et al., 2013), there is little support in our sample for the theory that SM are an important factor in the co-creation of value. For instance, the organizations rather marginally collaborate, namely make decisions with the user of SM in the implementation phase. *In this case, we propose that co-creation with the SM user is negatively associated with the organization in the implementation phase*. However, we have as well seen how companies may move from the co-production to the co-creation and optimize innovation of the products/services. Accordingly, we assume the significance of this finding with regard to (SM) innovation, namely the more the companies co-create value (make decisions) with the SM user, the more they are innovating services with the user of SM.

4.4. Conclusion

In the previous chapter, Chapter 3, we have conceptualized the model to narrow the gap with regard to our system, namely we sought to capture interactions in service innovation networks across different sectors and hierarchical levels with the SM. There are other assumptions, implications and hypotheses about the role of the interactive learning process of knowledge to produce (new) knowledge and contribution to the service innovation in different functions of the firm (see Chapter 2). However, no such argument is developed with regard to the interactional service innovation with the SM, especially in relationship to co-production and co-creation. Needless to say, results in that regard are scarce.

The aim of this chapter was to evaluate the role of interactional service innovation and extend the integration of embodied knowledge with the SM user in relationship to co-production and co-creation. Accordingly, we present the results from three different functions, namely creation, destruction and sustainability of the SM innovation. In addition, we have reasoned these results and derive general propositions with regard to further empirical investigation. In the following chapter we reformulate and validate these general propositions in order for them to be quantitatively tested on a larger sample and quantify the significance of our research.

5. SOCIAL MEDIA AND INTERACTIONAL INNOVATION: A CONFIRMATORY STUDY

In the second phase of our mixed-method research we want to test whether the theory and the underlying model of interactional service innovation with the SM can be generalized with a larger sample. In general, we apply Factor Analysis as part of the Structural Equation Modelling (SEM). This is a unique multivariate statistical procedure to test the theoretical model, including the hypotheses, with regard to the correspondence between scores on observed variables and hypothetical constructs or factors. In particular, we use Confirmatory Factor Analysis (CFA) (e.g. Cohen, Cohen, West, & Aiken, 2013).

In the first phase of our methodology we have to some extent already identified the potential CFA model. For instance, there is only one exclusive set of estimates, because the CFA is a restricted measurement. However, the CFA permits, depending on the model, the estimation of whether the specific variance is shared between pairs of indicators.

This chapter is further disposed as follows. Firstly, we develop the hypotheses according to the results of the previous chapter. Secondly, we explain the methodology and descriptive statistics of data gathered for this study. Thirdly, we estimate the sample and observe the potential (constructs) factors and evaluate the final model, test the hypotheses and present the results accordingly. Finally follows the discussion and conclusion of the study.

5.1. Impact of social media and interactional innovation: the main hypotheses

At the end of Chapter 4, we have discussed the qualitative results, theorized different observations and identified certain theoretical propositions that lead to the hypotheses of interactional innovation with the SM. In this section we reformulate these findings and develop the main hypotheses. In general, we propose that interaction with the user of SM has an impact on service innovation. In other words, we assume if the interaction with the SM increases, then the service innovation with the SM would increase too. However, drawing from the theory of interactional service innovation with the user of SM presented in Chapter 3, we see that interactions with the SM are not always beneficial for innovation.

The theory of interactional service innovation with the SM and how such processes work can be observed in Chapter 3. However, in Chapter 4 we can observe the results with regard to the important functions of the interactional innovation of creation, destruction and sustainability of SM innovation. It is according to these results that general propositions are derived. For instance, the participation of the user and organization in SM is associated during service innovation. On the one hand, the exchange and consumption process of information with the SM is positively associated with the analysis and implementation phase of the organization. On the other hand, the active participation of the SM user is negatively associated with the implementation phase of the organization. In the following paragraphs we articulate these ensuing propositions and develop the main hypotheses of interactional service innovation with the user of SM.

5.1.1. Hypothesis 1: the creation of social media innovation

The theory of interactional service innovation explains that innovation with the SM involves particular functionality. On the one hand, the user may participate in SM innovation actively/passively and provide particular information for the innovation processes. On the other hand, the organizations may lack the structure of information that the users generate. Either way, in Chapter 4 we have investigated this challenge and found that during service innovation active and passive SM use in organizations reduce the diseconomies of scope and R&D costs, and improve sales and innovation. Thus, we articulate the first hypothesis as follows.

> *Hypothesis 1: Participation in social media is associated positively with(in) organizations.*

5.1.2. Hypothesis 2: the destruction of social media innovation

The theory of interactional innovation with the SM presented in Chapter 3 also suggests that organizations may defend SM innovation in the innovation process. For instance, (internally) developed products are challenged in the organization due to the observation of information through the SM. Indeed, the findings in Chapter 4 indicate that organizations reduce diseconomies of scope with a different level of SM innovation (destruction). In addition, the organizations may use SM more at the front- than at the back-end of the innovation process. For instance, the organizations may rather leverage

the SM users about preferences, needs, desires, satisfaction, motives, etc. in the targeted market by asking questions or seeking lead-users, than obtain the solution information. Apparently SM activities are moderated with the innovation process activities. Thus, we articulate the second hypothesis as follows.

> *Hypothesis 2: The innovation process moderates the social media participation with(in) the organization.*

5.1.3. Hypotheses 3 and 3a: the sustainability of social media innovation

There is an assumption that the participation in SM is associated with organizations. However, in Chapter 4 we have found that organizations use particular SM specifics. For instance, the proposition of the previous chapter is that the information exchange and consumption process using SM is associated with the analysis and implementation phase of the organization. This is challenging, since organizations seek to leverage the opposite sides of social and economic properties. On the one hand, the users have social motivations and reasons for providing information for the innovation. On the other hand, organizations seek to use this information with the economic provision during service/product innovation. Either way, this challenge is investigated in Chapter 4, indicating the following results.

In general, organizations interact with the (user of) SM, leverage the social exchange (of information), and reduce the costs of service innovation. However, organizations apply different SM specifics at different phases to interact with the user of SM. With regard to the analysis phase the SM specifics unfold the product development and the organization's purposes. With regard to the implementation phase the SM specifics unfold three different types of engagements with a particular dynamic. In Chapter 4, specifically in Table 13, the example of three different types of SM engagements is illustrated along with its dynamic in the implementation phase. The specifics of SM follow different strategies for sustainability of SM innovation. On the one hand, the implementation phase is "close". In this case the organizations will adopt information from the internal organizational analysis with little to no (external) interaction with the SM. On the other hand, the implementation phase is "open" and organizations adopt the information for innovation together with the external partner, namely the user of SM

(e.g. outside-in engagement). Taken together, we articulate the third hypothesis as follows.

> *Hypothesis 3: The social media specifics moderates the participation of the social media user with(in) the organization.*

According to the theory and results of the interactional service innovation with the SM, the interactions in different phases of the organization involve the relationship between the user and producer with changing innovation, such as organizational structure and competences (e.g. Tushman & Anderson, 1986; Henderson, 1993) or experiences (see Chapters 2, 3 and 4). Indeed, the organizations and other users of SM participate in service innovation through different relationships. For instance, in Chapter 4 we have found homogenous behaviour with regard to the co-production and co-creation with the SM in the analysis and implementation phase within the organization.

The findings indicate that companies mainly co-produce value with the user of SM, while they rather marginally co-create value or collaborate actively with the user of SM. For instance, either in the analysis or implementation phase within the organization we see that SM are diffidently used; organizations apply certain specifics to sustain the SM innovation. However, little active collaboration with the user of SM is involved. Although companies may participate actively with the user of SM, they are still autonomously deciding about the innovation. In other words, organizations still see the participation of the (SM) user as in "second place".

With regard to active collaboration it should be noted that implementation also requires making decisions together with the user of SM, especially with regard to innovation activities. Indeed, organizations need to *lean* certain parts of the innovation to the user of SM, if we are to observe this as co-creation of value. In Chapter 4 we have found little support that such co-creation with the SM is significant, since organizations rather make little or no decisions about innovation with the user of SM. The findings from elsewhere suggest that co-creation also involves destruction or the loss of the value of services due to inefficient absorptive capacity[46] (e.g. Doroshenko & Vinogradov, 2014;

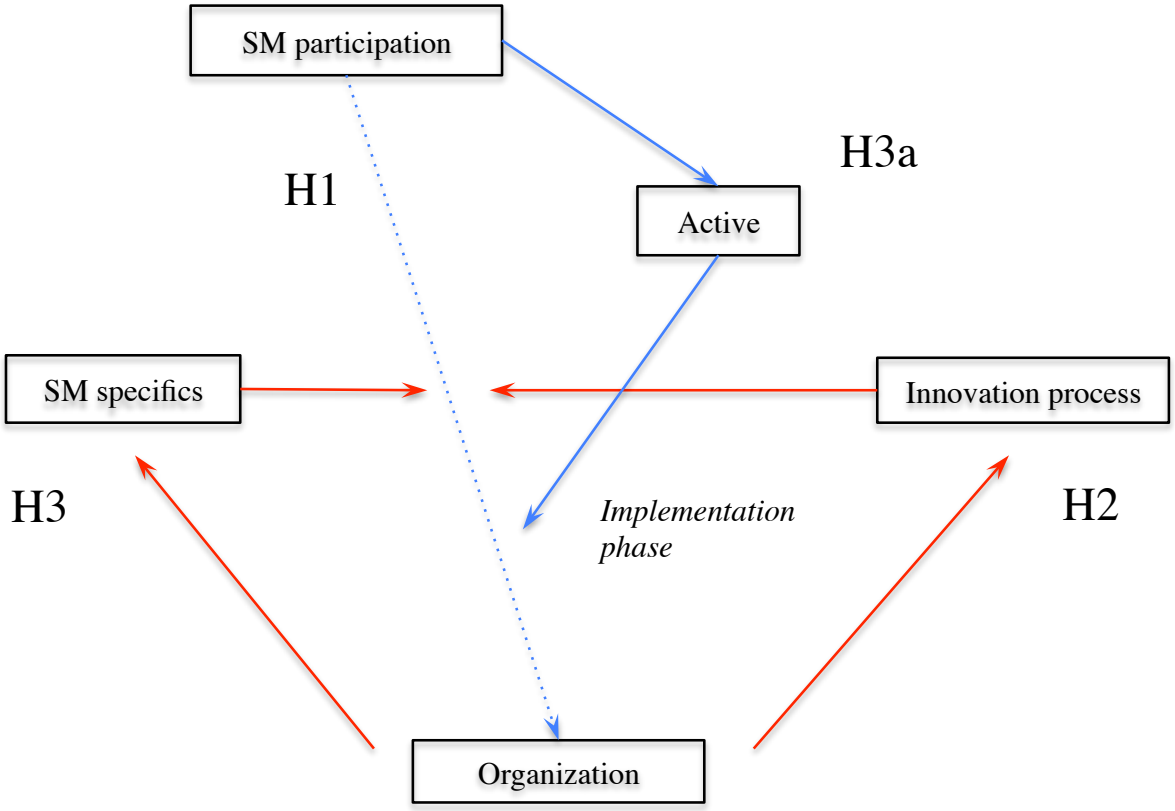
[46] The origins of inefficiency are explained by in-depth interaction between KIBS producers and consumers (co-production).

Kaartemo & Känsäkoski, 2014). Thus, we support the general proposition of the exploratory study and predict that the third hypothesis is extended as follows.

> *Hypothesis 3a: Active social media participation is negatively associated with the implementation phase within the organization.*

In the following figure we illustrate the above articulation of the main hypotheses.

Figure 18: Summary of the hypotheses[47]



The above hypotheses are addressed with a particular quantitative study. In the next sections we describe the methodology of this study.

[47] The mediation of H3a does not supersede complete SM participation. For instance, SM participation is also mediated by passive participation.

5.2. Methodology

This study employs particular methods of data-gathering processes and descriptive statistics. Firstly we follow the explanation and presentation of the data-gathering process. Secondly we follow the descriptive statistics of the respondents and data sample.

5.2.1 Data-gathering process

To successfully collect data for the quantitative study we had to develop an appropriate data-gathering tool. In our case, we have chosen the questionnaire. With this questionnaire we elicit the feelings, beliefs, experiences and other perceptions that may have been in the way of data collection using interviews in the previous chapter (Key, 1997). For instance, with the questionnaire we focused on the scope of information that we sought from the respondents. Essentially we introduced a formal questionnaire with explicit wording and an order of questions that ensured that each informant received equal motivation. This followed the arranged definition of each question to ensure consistent information comprehension. We sought a simple and easy questionnaire design for rapid completion in the final survey process.

In this way we experienced the advantages in economics and in uniformity of gathering data. For instance, the expenses and time involved with gathering data were majorly reduced with the ability to administer the questionnaire. In addition, each informant received the same questions, which may yield data more comparable than information obtained with the interviews. However, the respondents may be inclined to answer the questions or it may be difficult to answer the questions for them, which eventually affects the validity. Before we conducted the final survey, we followed the development of an appropriate questionnaire, which involved careful design, followed by a pilot test. In the following subsections we describe how we approached and conducted the final survey.

5.2.1.1. Questionnaire design

The design of the questionnaire involved certain preparations (e.g. Fraenkel & Wallen, 1993). The importance was in making decisions about what to ask and what kind of information we wanted to obtain. For instance, we had to carefully design the questions according to the dependent variables or information that were primarily sought, independent variables or information that might explain the dependent variables, and

confounding variables or factors related to the dependent and independent variables. Essentially we had to overcome the open- with the closed-ended questions. *In this case we observed typical warnings with regard to designing the questionnaire, such as those about wording of individual questions, format responses, the length of the questionnaire, arrangement of the questions, ending of the questionnaire and the introduction/personalized letter* (Duncan, 1979; Peeters, van Tuijl, Reymen, & Rutte, 2007).

The major problem was to design the questions so that the general public could understand them. For instance, the questions that were written in a scientific way did not necessary resonate well with the audiences from whom we were seeking information. Consequently, we were using techniques to optimize the questionnaire, such as short and simple sentences with no more than two clauses. For instance, we asked for only one part of the information at a time, and we never used a double negative. In fact, we wanted to avoid negatives, while at the beginning of each question we paid attention to the reference frame.

Challenges may occur with ensuring the right informants with the necessary knowledge are used. As we will see, in the pilot study, we had to correct the questionnaire due to assumptions with regard to our audience. For instance, we took for granted that informants would automatically have information to our answers. However, we did not have many problems with the level of details provided. We assume this improved with the guiding of informants. For instance, we were firstly asking general, and then specific, questions. In the main, the questions were short. This helped to omit the unnecessary information and complete the questionnaire quickly.

The questionnaire had to be designed in order to avoid sensitive issues. On the one hand, we assumed that our questions were not sensitive, either for the organization or the informant. On the other hand, we were concerned about bias. For instance, people may tend to answer questions in a certain way in order to be socially accepted/desired. We assumed this was even more pertinent with evolutionary popular phenomena, such as SM.

We were focused on closed-ended questions, namely we wanted to fit the questionnaire to our qualitative research as presented in Chapter 4. For instance, we wanted to make explicit measurements due to the methodology that we are using in this chapter.

Consequently, we avoided open-ended questions, because they enable respondents to formulate their own answer. In our case, this is a disadvantageous step in the research, especially due to the restricted measurements of CFA.

However, it is not always possible to create the questionnaire only with closed-ended questions. In addition, each type of question has its own benefits and it is possible to use a combination of both. For instance, after the closed-ended questions, with a list of possible answers, an open-ended question can follow, as a final option, e.g. “other” followed by a space to collect information about other alternatives. Therefore, we could extend more or less all of our questions which had more than two optional answers with the space to collect other information. However, this approach offers only some flexibility with regard to the forced choice formats. In addition, we were quite explicit about the questions we sought.

In general, there is no universal agreement in regard to the optimum length of the questionnaire. Usually, it more or less follows the type of respondents. However, short and simple questionnaires usually have higher response rates than longer and more complex questionnaires. One example is the comparison of a short questionnaire of six questions and a visual analogue scale for a survey of stroke survivors with a longer and more complex questionnaire of 34 questions (Dorman, Slattery, Farrell, Dennis, & Sandercock, 1997). The researcher should keep in mind that it takes a lot of time to make a short and effective questionnaire.

At the beginning of the questionnaire, we introduced the survey with particular wording. Namely, we wanted to explain to the potential informants the aim of our survey and how much time, approximately, they may have needed to complete the questionnaire (Bissett, 1994). We also included a statement that the answers would be treated with the utmost confidentiality.

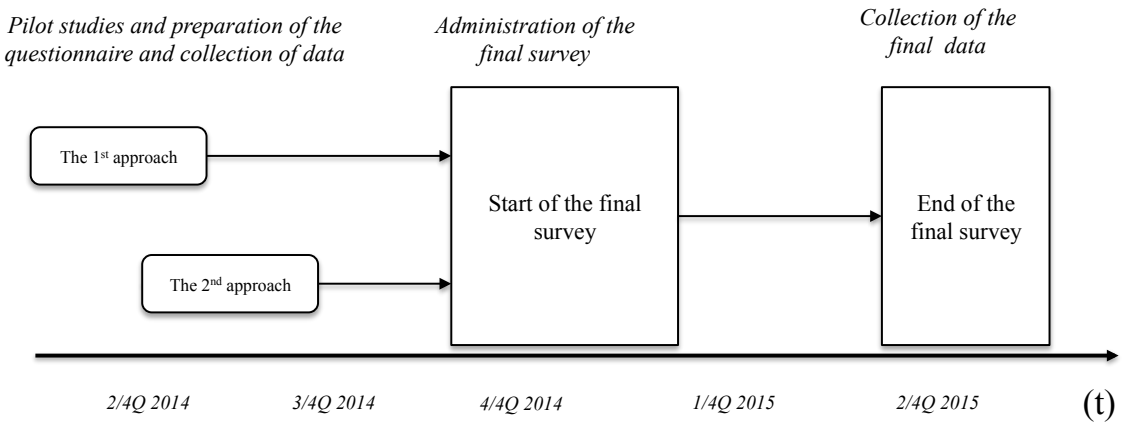
5.2.1.2. Pilot study of the questionnaire

Once we designed the questionnaire (see Appendix D for the final version) we approached a pilot study group and tested the questionnaire on a small sample. For instance, we administered the pilot version of the questionnaire to 11 informants. This test revealed several different discussions about the clarity of the questionnaire. The major problem was with the clarity of certain questions. For instance, in the pilot study we did not allow the respondents to skip questions whose terms or ideas they were not familiar with. Consequently, certain informants did not complete the questionnaire, and in fact quit the survey. In addition, in the pilot study the respondents found the questionnaire too long. Consequently, we shortened the questionnaire and let the informants skip questions, if so desired. Although this implies an issue in regard to the validity and outliers of data, we have not experienced issues with the number of unanswered questions, as we will see in the descriptive statistics measurements. In addition, at the end of the questionnaire we included a short set of questions about the demographic details of the informants and a note thanking them for their participation.

5.2.1.3. Final survey

In general, online surveys are gaining ground in research (K. B. Wright, 2005). On the one hand, the advantages are mainly in their access to unique populations, and in time and costs. On the other hand, their disadvantages are in sampling and access. Either way, our final questionnaire was administrated online in two ways. Firstly we wanted to make a survey without the financial constraints. Secondly, we wanted to speed up the process, because the first collection of data was relatively slow. Therefore, we used a pay service that we could afford. In the following, we illustrate the evolution of our surveys in Figure 19 and describe how we approached the final collection of data.

Figure 19: The evolution of the survey and final collection of data



Firstly, we distributed the questionnaire with publicly available SM (i.e. LinkedIn, Twitter). In this case, we created a program to obtain certain number of contacts. This was achieved in R and dedicated packages for communication with the API (see Appendix A for the API code) (R Development Core Team, 2012). We obtained a number of different SM contact details of high-tech entrepreneurs, especially those whose innovations were recently supported by venture capital (cf. CrunchBase). We assumed these informants were appropriate, since they may have had information with regard to our survey. In any case, the selection of the potential informants was random.

Despite carefully following the terms of CrunchBase service, our first approach had two major drawbacks. Firstly, we could not automate the process of sending the questionnaire to the selected contacts (i.e. potential respondents). For one thing, this would have saved us a lot of time. Consequently, the distribution of the questionnaire was manual. This was also the case because the SM contact details "locked us in" to the particular SM service that we used to distribute the questionnaire. In this case we were not allowed to send the link to the final survey without establishing contact in advance. We circumvented the issue with the administration of the questionnaire to a larger base of respondents than ours. For instance, we identified potential contacts in the SM industry that had more contacts and were willing to help us distribute the questionnaire. Eventually, we constructed a base of contacts that redistributed our questionnaire. However, once a questionnaire is distributed to a number of potential respondents there is still the question of response. The response rate of this approach was almost 23%, which is not surprising with regard to online surveys (Sheehan, 2001). However, with the first approach we obtained data rather more slowly than with the second approach.

Secondly, the collection of data was administered with the Mechanical Turk (MTURK) service as suggested elsewhere (Buhrmester, Kwang, & Gosling, 2011). We collected information from an extra 150 informants. It may sound like this approach is simple to use; unfortunately, this is not the case and we faced two major problems. The first was with the administration of the survey. It should be noted that currently the MTURK service is only available to US citizens (accessed 2/4Q, 2015). Indeed, we had to administer the questionnaire from the US to actually obtain a response. In addition, since this service is paid, the responses were limited to the allotted budget.

The second problem of this approach was the demographics of informants. For instance, our theory is designed to obtain responses from companies and their employees, such as managers. These informants may not be available on MTURK. To counteract this problem to some extent, we had to carefully describe the demographics of the informants we wanted to reach, especially from whom we wished to obtain the information. Indeed, to reduce the problem further, we had to redesign the questionnaire so that it was useful to collect information from the general public. Modifications were rather trivial. However, we had to change the wording carefully since this may have affected the collection of information. This eventually led to the final questionnaire. It should be noted that the response rate on MTURK is much more reliable than the collection of data in the first approach. For instance, we reached an almost 99% response rate. In addition, we obtained information much quicker than in the first approach. This is not surprising since the informants were paid to respond.

In total we distributed N=650 questionnaires and obtained information from n=224 respondents. The response rate of our final survey was around 29%. We assume that since we used the same questionnaire in both cases, the respondents provided equally biased answers, regardless of the approach used for the collection of data.

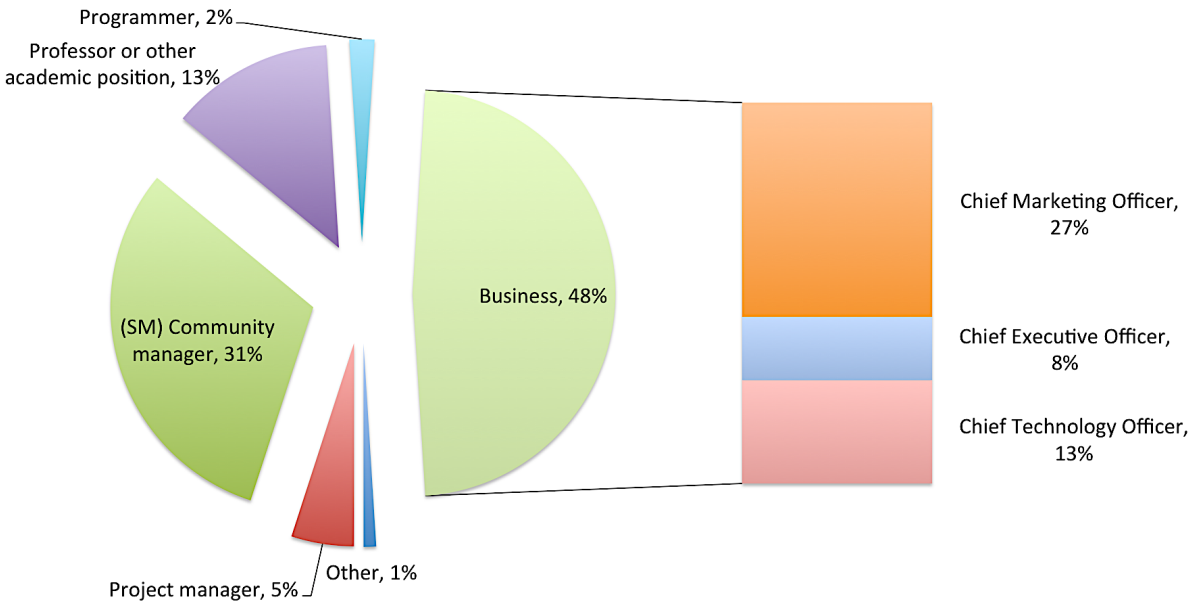
5.2.2 Descriptive statistics of respondents and data sample

In this section we provide descriptive statistics of the gathered data, namely of the respondents and data sample. We note that our data have certain missing values, which we investigate with the description of the data sample. However, with regard to the descriptive statistics of the respondents we skipped the analysis of missing values. In general, we believe that the presented analysis reflects the pattern with regard to the respondents in our survey.

At the end of the questionnaire we collected descriptive information about the respondents (see Appendix E with regard to the descriptive information). In the following we present the measures of this information with regard to the informants that responded in our final survey (n=224).

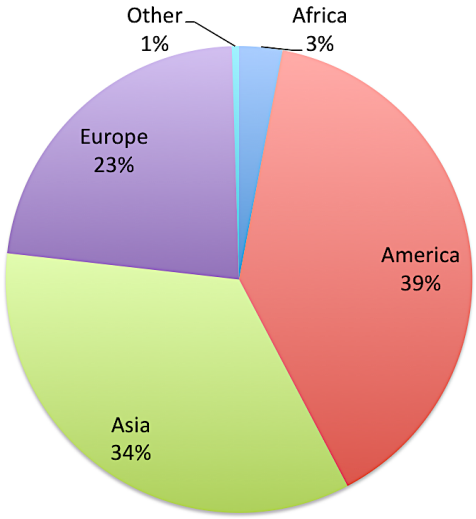
As we can see from Figure 20 in our case the business functions as a group of CMO, CEO and CTO informants who represented the largest portion of respondents to our survey. Secondly followed the (SM) community manager's role, and thirdly professors or other academic roles.

Figure 20: The professional roles of study participants



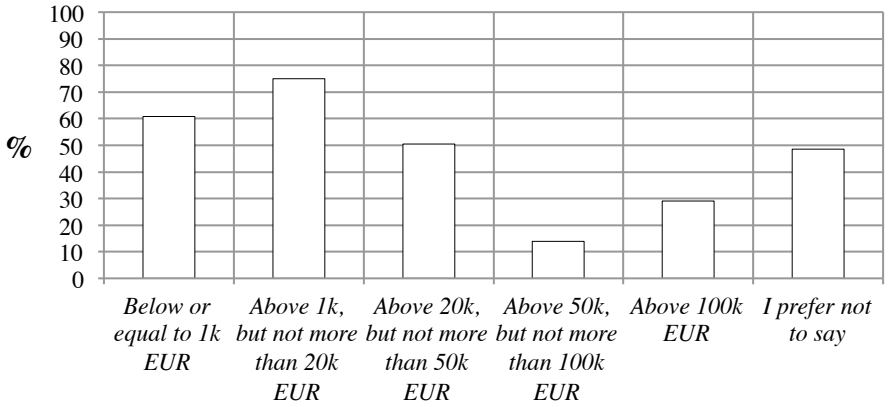
In Figure 21 we can see that the highest volumes of our informants were from America, then Asia and then Europe. Interestingly, informants from Africa were self-acknowledged, while "other" were mostly respondents from Australia.

Figure 21: The locations of the respondents



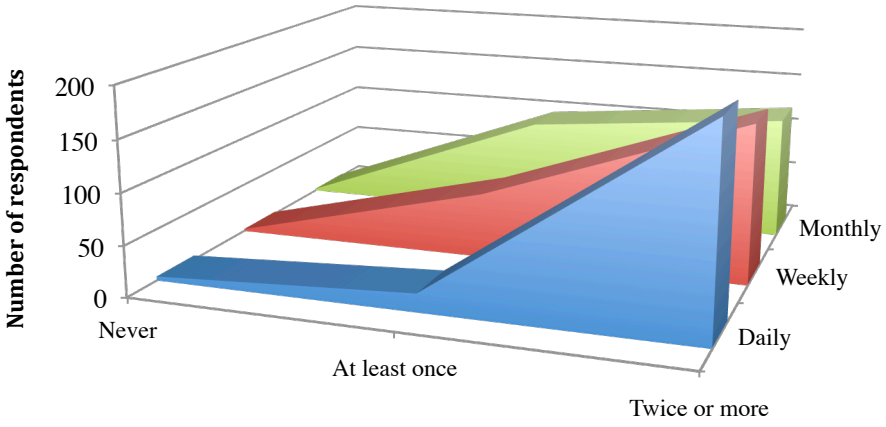
In Figure 22 we observe that respondents in our survey mostly involve SM in projects that have financial scope of around 1k EUR or less. However, SM are also used in projects with up to 20k EUR. Apparently the projects between 20k and above 100k EUR do not involve SM much. However, we also note that certain respondents did not want to share the financial scope of SM involvement in their projects, which is relatively high in comparison to the total number of respondents.

Figure 22: Financial scope of the project where social media are involved



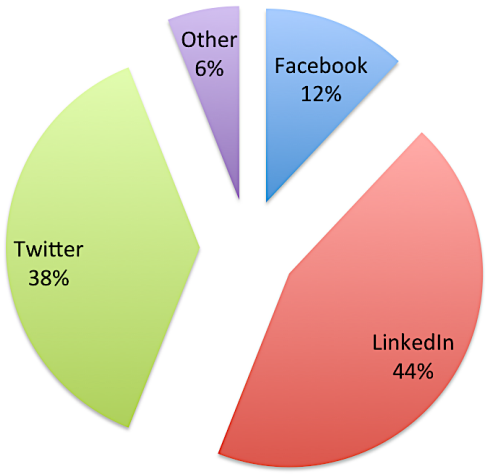
In Figure 23 we see that in our case respondents use SM rather frequently. For instance, some would use SM daily and more than once. However certain respondents in our sample did not use SM for months, while others, relatively very small proportions of respondents, may not use SM at all.

Figure 23: The frequency of social media use



In the last question of our survey we were interested what type of SM our respondents use. As we can see from the Figure 24, LinkedIn is used most. We assume this is due to the general awareness that this type of SM is most appropriate for business from the perspective of our research. Indeed, the focus of the questionnaire administration was on business-oriented informants. However, Twitter follows, while Facebook is not much used by our informants. In addition, we observed that a very small proportion of the respondents also use "other" publicly known SM, such as Pinterest, Quora, Instagram, YouTube and other blogging platforms etc.

Figure 24: Type of social media use (% of respondents)



Next we present the descriptive statistics of the data sample. How the data was gathered can be observed in the previous section, including the descriptive statistics about the respondents. However, before we started with the descriptive statistics of our data sample, we checked for missing values. There were 34 missing values in the whole data sample. In general, we believe this is too critical to be left unnoticed (i.e. 15.1% for the size of our population). See Appendix C, namely Missing values of data sample on p.9 for information.

There are several ways to impute the missing values (e.g. Acock, 2005). We have applied the Predictive Mean Matching (PMM) or the multiple imputation by chained equation or MICE (e.g. Bruin, 2011). This method ensures that imputed values are plausible (Horton & Lipsitz, 2001). Although, there is no ideal strategy of imputation and each is useful for an individual data sample and its missing values (e.g. Su, Yajima, Gelman, & Hill, 2011), the PMM that we applied imputed all of our missing values. **Error! Reference source not found.** presents the summary of descriptive statistics of the imputed data.

Table 16: Descriptive statistics of the data sample

Observed variables	n	mean	sd	median	trimmed	min	max	range	skew	kurtosis
i1	224	4.08	1.32	4	4.11	1	7	6	-0.11	-0.57
i2	224	3.17	1.4	3	3.1	1	7	6	0.57	0.09
i3	224	4.21	1.32	4	4.24	1	7	6	-0.08	-0.31
i4	224	4.1	1.44	4	4.13	1	7	6	-0.14	-0.4
i5	224	4.16	1.37	4	4.19	1	7	6	-0.11	-0.4
i6	224	4.26	1.31	4	4.31	1	7	6	-0.19	-0.29
i7	224	4.35	1.23	4	4.35	1	7	6	-0.05	-0.03
i8	224	3.74	1.4	4	3.74	1	7	6	-0.09	-0.53
i9	224	3.84	1.37	4	3.84	1	7	6	-0.05	-0.39
i10	224	4.12	1.23	4	4.16	1	7	6	-0.21	-0.33
i11	224	3.67	1.2	4	3.69	1	7	6	-0.08	-0.22

From Table 16, above, we see that 224 informants responded to our survey, so the sample size is n=224. Mean of all items is around 4, which means that informants on average agreed with the asked questions; except the i2 variable, which has a mean around 3. In general, the statistical properties of our sample are good (Joanes & Gill, 1998). The Kurtosis statistics, namely deviation of observed variables, indicates that our respondents are mostly around -0.03; the skewness value is low (mean around -0.01);

the standard deviation is around (mean) 1.34. The values of variables are around mean and we can conclude this is appropriate. We do not seek to transform, exclude, etc. the variables.

Next we look at the correlation matrix. Due to the use of ordinal variables, we have used Spearman's coefficients to calculate the correlation between the observed variables. The correlation matrix is presented in Appendix F in a tabular and graphical form. For instance, in Figure 27 on p. 15 we provide a graphical form of the correlation matrix between the observed variables for a quicker and easier observation of data. As can be seen from the matrix, most of the observed variables are positively correlated. In general, when the value of the variable is increasing with the correlated variables, then the correlated variable also increase. However, this is inversed for the correlations between i1, i7, and i2, i5.

Table 17: Means, standard deviation, and correlations

	mean	*s.d.*	i1	i2	i3	i4	i5	i6	i7	i8	i9	i10	i11
i1	*4.08*	*1.32*	(0.82)										
i2	*3.17*	*1.4*	0.21**	(0.86)									
i3	*4.21*	*1.32*	0.72***	0.22***	(0.82)								
i4	*4.1*	*1.44*	0.69***	0.14*	0.71***	(0.83)							
i5	*4.16*	*1.37*	0.3***	-0.02	0.34***	0.28***	(0.83)						
i6	*4.26*	*1.31*	0.37***	0.07	0.39***	0.28***	0.63***	(0.83)					
i7	*4.35*	*1.23*	-0.07	0.07	0.04	0	0.14*	0.12*	(0.86)				
i8	*3.74*	*1.4*	0.39***	0.08	0.43***	0.35***	0.45***	0.35***	0.04	(0.82)			
i9	*3.84*	*1.37*	0.41***	0.13*	0.46***	0.29***	0.42***	0.38***	0.01	0.62***	(0.82)		
i10	*4.12*	*1.23*	0.33***	0.13*	0.36***	0.27***	0.34***	0.31***	0.03	0.64***	0.67***	(0.82)	
i11	*3.67*	*1.2*	0.37***	0.09	0.34***	0.3***	0.34***	0.35***	0.05	0.6***	0.62***	0.59***	(0.82)

Note: n=224. Coefficients alphas are on the diagonal in parentheses, * $p < 0.10$, ** $p < 0.01$, *** $p < 0.001$

5.3. Results of the confirmatory study

In this section we evaluate the conceptual model of interactional service innovation with the SM and test the hypotheses that we formulate in the first section of this chapter. In this case we measure the underlying constructs of the model with the data that was gathered for this purpose. All the measurements, analysis, CFA modelling and other observation of data with the formal statistics are performed with the free statistical software R and dedicated packages (Epskamp, 2013; Pornprasertmanit, Miller,

Schoemann, & Rosseel, 2013; R Development Core Team, 2012; Rosseel, 2012). All of the code that was created and used in this chapter can be found in Appendix B, including Appendix A. This section is further disposed as follows. Firstly, we analyse the data with the interest of justifying the number of significant factors for the CFA. Secondly, we evaluate the individual factors, namely the constructs and model, with typical fitness statistics. Finally, we test the hypotheses.

5.3.1. Factor analysis

Due to the qualitative study we assume that our measurement model will indicate three factors in the data sample. Consequently, we test our data with regard to three factors, performing this function in R. A quick exploratory factor analysis shows that our data indeed represent three factors. In Table 18 we present the factors and their loadings (the italics are indicating the highest loading values). According to Table 18 we can observe the existing factors with further analysis. The typical statistics are in our favour, namely our data pass the classical test theory of Cronbach α (Cronbach, 1951). For instance, according to the results we can say that our data has good internal consistency, or our data sample has a good coefficient of reliability (raw $\alpha = 0.87$).

Table 18: Observed factors and items[48]

Items	*Factor 1*	*Factor 2*	*Factor 3*
i1	0.229	*0.778*	0.209
i2		*0.286*	
i3	0.248	*0.785*	0.270
i4	0.127	*0.818*	0.171
i5	0.258	0.127	*0.797*
i6	0.211	0.197	*0.724*
i7	0.229	0.116	*0.743*
i8	*0.711*	0.257	0.307
i9	*0.759*	0.234	0.236
i10	*0.794*	0.182	0.185
i11	*0.713*	0.200	0.210

[48] Italics ours.

In addition, we create the test according to the typical SPSS software statistics and see that sampling adequacy and the test of sphericity are good. See Appendix E, Table 22 where we present the results. According to these tests of variables' appropriateness and reliability we can confidently perform Principal Component Analysis (PCA). With PCA we are seeking the dimensionality in our sample. In the Appendix E, Figure 28 on p.16, we present the Scree diagram of PCA. As can be seen the eigenvalues, above 1 indicates three factors differently. In Figure 28 and Tables 24 on the same page (237) we present more detailed observation of the factors, namely we are interested to underscore the items, which are important in our factor analysis.

In Table 26 we see that the components 1, 2 and 3 present most of the variance in our sample, namely 75%. According to the "heuristic" factor analysis (Jackson, 1993) and the component matrix as indicated in Table 26, we can confidently disregard the observed components that have eigenvalues lower than 1. Means, standard deviation and correlations of the key study variables have already been presented above in Table 17 on p.161.

5.3.2. Assessment of the constructs and model

According to the qualitative study we seek a model with three factors. Each of these factors is represented as a particular construct manifested with different observed variables (items) that we present in Table 19, namely APP, INN and ORG constructs. The items in our study were ordinal. For instance, we have used the Likert-type scale between 0 and 7 to evaluate the answers to the questions (Likert, 1932). It should be noted that the type of variables is important for the statistical computations.

Table 19: The observed variables[49]

Item	Description
Approach to SM (APP construct)	
i1	Active participation on SM is very important to me.
i2	I am very interested in designing products via SM.
i3	I use SM only to obtain information.
i4	User profiling and other content analysis on SM are very important to me.
Innovation process (INN construct)	
i5	Is interaction with SM important for innovation?
i6	Would you agree that you provide information about needs and preferences on SM?
i7	Would you agree that you provide technical solutions on SM?
Interface between the service provider and user (ORG construct)	
i8	Would you agree that you engage with the product also via SM?
i9	Is it important to choose the specific SM engagement mechanisms that could be used?
i10	Would you agree that you implement what you have learned on SM?
i11	Is it important to make SM decisions according to organizational needs?

In the following we test the constructs nested by the model. A series of four factor analyses are conducted in total. Initially, we conduct three separate confirmatory factor analyses, one for each of the three constructs. The figures of all constructs can be observed in Appendix F.

[49] The table is constructed according to the final questionnaire that is attached in the Appendix D.

Figure 29 on p.17 presents the factor diagram with superimposed standardization coefficients, including residuals associated with the model conducted for factor 1 (APP construct). In Table 20 the results of this analysis are presented. High standardized estimates were indicated along with excellent model fit, indicating the appropriateness of this factor solution.

Table 20: The results of the APP construct analysis

Item	Estimate	Std. error	P(>|z|)
i1	1.000		0.000
i2	0.365	0.088	0.000
i3	1.022	0.067	0.000
i4	1.088	0.073	0.000

Note. Normed $\chi^2 = 0.997$; TLI = 1.000; CFI = 0.996; RMSEA = 0.057.

Figure 30 on p.17 presents the model diagram associated with the analysis conducted on factor 2 (INN construct). This also presents the superimposed standardized and residuals estimates associated with this analysis. As presented in Table 21, standardized estimates were found to be high for item i5, though the standardized estimates were lower for items i6 and i7. Perfect model fit was indicated here due to the fact that this model had a degree of freedom equal to zero.

Table 21: The results of the INN construct analysis

Item	Estimate	Std. error	P(>|z|)
i5	1.000		
i6	0.885	0.077	0.000
i7	0.841	0.073	0.000

Note. Perfect model fit *df* = 0.

Figure 31 on p.17 presents the model diagram for the analysis conducted on factor 3 (ORG construct). As shown in Table 22, high standardized estimates were indicated for all three items, indicating the appropriateness of this factor solution.

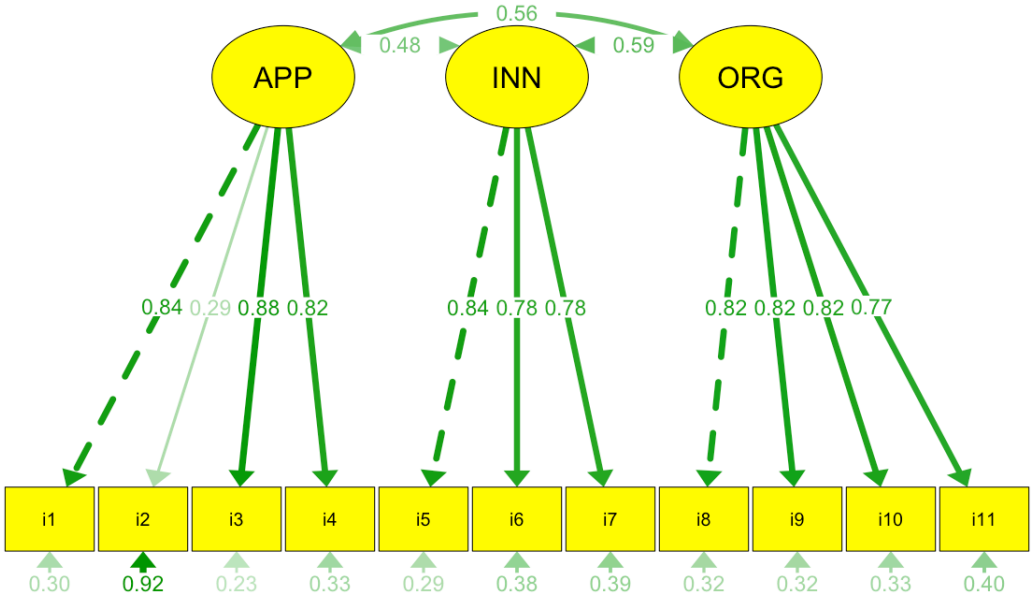
Table 22: The results of the ORG construct analysis

Item	Estimate	Std. error	P(>|z|)
i8	1.000		
i9	0.996	0.075	0.000
i10	0.899	0.067	0.000
i11	0.819	0.066	0.000

Note. Normed $\chi^2 = 0.999$; TLI = 0.992; CFI = 0.997; RMSEA = 0.053.

Next we evaluate the model. In Figure 25, below, we illustrate the SEM. This is our full model, further estimated, incorporating all three factors. Standardized covariances are presented here, along with the standardized path estimates and residuals.

Figure 25: The model



As shown in Table 23, standardized estimates were found to be high in most cases, except with item i2 which was associated with the APP construct. These analyses, along with those presented earlier, would suggest that factor 1 could be improved, while factors 2 and 3 have an appropriate structure. However, with regard to the model, the fit was found to be excellent.

Table 23: The results of the model

```
lavaan (0.5-18) converged normally after  32 iterations
                                                      Total
Number of observations                                224
…
Comparative Fit Index (CFI)                           0.993
Tucker-Lewis Index (TLI)                              0.990
…
Root Mean Square Error of Approximation:
RMSEA                                                 0.031
90 Percent Confidence Interval                 0.000  0.058
P-value RMSEA <= 0.05                                 0.857
Standardized Root Mean Square Residual:
SRMR                                                  0.034
Parameter estimates:
  Information                                         Expected
  Standard Errors                                     Standard
                   Estimate  Std.err  Z-value  P(>|z|)
Latent variables:
  APP =~
    i1                1.000
    i2                0.367    0.088    4.181    0.000
    i3                1.044    0.070   14.882    0.000
    i4                1.067    0.077   13.929    0.000
  INN =~
    i5                1.000
    i6                0.892    0.074   12.133    0.000
    i7                0.837    0.069   12.109    0.000
  ORG =~
    i8                1.000
    i9                0.978    0.071   13.821    0.000
    i10               0.868    0.064   13.673    0.000
    i11               0.802    0.063   12.756    0.000
…
```

Note. $df = 41$, p = 0.805, Normed $\chi^2 = 0.999$; TLI = 0.990; CFI = 0.993; RMSEA = 0.031. (Certain data omitted)

With regard to the model, the lower portion of the above summary (see Table 23) indicates that fit indices are strong (e.g. CFI = 0.993) and residuals are relatively low (e.g. RMSEA = 0.031). In addition, all of the latent variables (constructs) are significant (P (>|z|) = 0). For instance, the observed variables are similar to one another, magnitudes varying between 0.367 and 1.067. This could be better, namely these values should fluctuate around 1 as the observed variables are assumed to add together as

different scales. In our case the discrepancies are evident due to the estimate of the i2 variable that has an estimate of 0.367.

The standard formal fit criteria statistics are adopted. It should be noted that there also exist other criteria that we did not observe. For instance, we could observe Bayesian or Akaike's Information Criteria (BIC, AIC) as good indicators of parsimony (Dziak, Coffman, Lanza, & Li, 2012). However, our final model is nested, which usually makes the AIC estimation less sensible to observe. In any case, how other formal statistics could be used is discussed elsewhere (e.g. Burnham & Anderson, 2002).

Most of the crucial information from the longer CFA assessment text that we have been through can already be observed in Figure 25: The model. For instance, the graphical version makes it easy to see the relationships between the latent and manifested variables, including browsing the coefficient and residual values. Hence we have provided the graphical representation of the full model here. However, the graphical presentation of all the individual constructs' models can be also observed in Appendix F.

Although it is reasonable to assume that other, better models might exist, we have not sought one. In addition, we defend the original model not only in terms of statistics, but also in terms of the theory that is presented in Chapter 3. For instance, from the beginning we aimed to derive the model with three factors. With the CFA we have confirmed that our measurement model is defendable with respect to the data that we have gathered for this purpose. Therefore, we can generalize the results with regard to the hypotheses that we explore next.

5.3.3. Hypothesis tests

In this section we examine the impact of social media and interactional service innovation that we unfolded in the first section of this chapter. Namely we will test the main hypotheses and present the results. In general, we observe the correlation between the particular constructs and their manifested variables to test the hypotheses as formulated above. Since all variables are ordinal, Spearman's correlations were used for the hypothesis tests. All of the figures are in Appendix G.

The first hypothesis consists of the following: *Participation in social media is associated positively with(in) organizations*. Specifically, it was hypothesized that the items (i1, i2, i3, i4) of the APP constructs have a significant, positive relation to the organization that is using SM, namely the observed variables of the ORG construct (i8, i9, i10, and i11). From Figure 32 we can summarize the results in relation to this first hypothesis. As we have shown, the statistical significance was indicated in most of the cases. However, the estimate of the i2 variable does not indicate significant correlation between the i8, i9, i10, and i11 variables. In general, with the i2 the attention was on the level of users' involvement in SM activities. In this case we can argue that the active SM participation is not significant for the organization, since the level of user involvement is insignificant. In addition the effect size almost does not exist. The effect size and statistical significance of the correlations can be observed in Figure 32.

The second hypothesis consists of the following: *The innovation process moderates the social media participation with(in) the organization*. Specifically, it was hypothesized that the observed variables (i5, i6, i7) of the INN construct have a significant, positive relation to the organization that is using SM, namely ORG (i8, i9, i10, and i11). As we have shown, the statistical significance was indicated in most of the cases. However, the estimate of the i7 variable associated with the INN construct does not indicate significant correlation or the effect size with the ORG construct. Observing Figure 33, we can see that the SM participation is not significant at the back-end of the innovation process. In this case, we support the proposition that SM is more useful in the front- than at the back-end of the innovation process. Indeed, the innovation (destruction) is present. However, there is no correlation between the SM activities and organization at the back-end of the innovation process. The effect size and statistical significance of the correlations between each item can be observed in Figure 33.

The third hypothesis consists of the following: *The social media specifics mediate the participation of the social media user with(in) the organization*. Specifically, it was hypothesized that the APP (i1, i2, i3, i4) have a significant, positive relation to the organization's SM specifics, namely with the ORG (i9). As we have shown, the statistical significance was indicated in most of the cases. However, the estimate of the i9 variable does not indicate significance and effect size with the APP construct, namely with the i2 variable. In this case we can argue that SM specifics do mediate the SM participation. However, the effect size is very low. The effect size and statistical significance of the correlations can be observed in Figure 34.

The third hypothesis is supplemented with the following: *Active social media participation is negatively associated with the implementation phase within the organization*. Specifically, it was hypothesized that the APP (i1, i2) have a significant, positive relation to the implementation phase of the organization with the ORG construct and its variables i10 and i11. As shown in Figure 35 the i1 or active participation in SM activities has a significant correlation with the implementation phase, including making decisions in the organization. The effect size of this correlation is relatively low. However, as observed by the ORG construct's variables, namely i11, it is important that the organizations make decisions about the SM according to organizational needs.

In this case, we argue that SM co-creation is negative for organizations, because organizations would put their decision before the user of SM. In Chapter 4, we have seen the example of limitation of the user involvement in active participation. For instance, the community engagement that may lead to participatory design is limited in creation of SM innovation (see Chapter 4). Although the user of SM is participating in the design of products, it is the company's organization that eventually makes the decision about the product. In this case we support the hypothesis that co-creation with the user of SM is not significant for the organization during service innovation.

5.4. Discussion

The study above unfolds the impact of service innovation with the SM. In general, we find support for the idea that SM are significant during service innovation. For instance, we support most of the propositions derived in the exploratory research, namely the arguments of the qualitative study that interactional service innovation with the user of SM involves functionality of creation, destruction and sustainability. Although certain propositions and hypotheses were already revealed with the previous study, it is with this study that we articulate and test the final hypotheses. In general, we have seen three hypotheses and one extension, namely the co-creation of value with the user of SM during service innovation.

In this study we have gathered data with two different approaches and presented descriptive statistics of the respondents and data sample. However, we have found the factor solution and final model with regard to data that we have gathered for this purpose. Next we touch upon the confirmatory study. With regard to the results of the confirmatory study we note two important remarks. Firstly, according to our study, it may not be necessary to seek an alternative model. For instance, in our case we have underscored that the model fits with the gathered data. This improves our confidence about the survey approach and study. Another important remark for service innovation study is the fact that a multidimensional model is necessary to measure the complexity of SM integration. In this case we note the CFA may be used alongside comparing the data from elsewhere. For instance, when we designed the measurement scale, we could already (ad-hoc) test the assumed factor model with integrating the dimensions from elsewhere. This is a common practice in research studies and with the CFA we could do certain preliminary testing by combining different dimensions with regard to different models.

In terms of theory we can now more thoroughly observe the interactional service innovation with the user of SM. For example, the three-factor model better explains the research than a one-factor-only model would. This is due to the fact that we seek more informative and discriminated relationships than we would with only one factor or a more restricted measurement that CFA already is, for example. Indeed, we have encompassed a particular approach to SM and how companies identify information with SM. These are only some of the important dimensions in researching innovation with

the SM in general and we have extended this conceptualization with another dimension of how the organizations interface with the SM in terms of innovation. It should be noted that this study reveals only one example of how to measure service innovation with the SM. Needless to say, we used the CFA to evaluate the theory and model of interactional service innovation with the user of SM on a larger sample.

With regard to the results of the hypothesis tests we unfold the following. In general, we confirm the results of the previous chapter, namely that SM during service innovation involve functionality of three different, but mutually dependent, dimensions, eventually functions of creation, destruction and sustainability of SM innovation. Firstly, the creation of SM innovation is important for organizations. For instance, we have found that participation in SM is majorly positively associated with the organization. In this case companies may reduce diseconomies of scope, R&D costs and improve sales and innovation.

Secondly, the innovation (destruction) is present in SM activities. We find support for the idea that SM are more useful in the front- than at the back-end of the innovation process. However, certain companies would combine both ends and link the SM with the back-end of the innovation process. We have not explicitly observed this relation. Finally, the sustainability of SM innovation is crucial to leverage SM innovation in general and the function of creation and destruction of SM innovation in particular. However, the results indicate that organizations need to improve the ways that they actually co-create value with the user of SM, namely make decisions about innovation.

5.5. Conclusion

The model that we have derived with the qualitative study (see Chapter 3 and Chapter 4) is good and can be used on a larger data sample. Therefore, we can generalize the results with regard to the hypotheses. Although companies leverage SM to some extent, the findings indicate that co-creation of value between the SM and organizations is not significant. Although SM offer ample interactions, with this study we amplify that this should be explored further. For instance, the theory of this study has not been fully researched; and the data sample could be explored further. Firstly, certain variables of the data could already be investigated further with this study. The case in mind is the passive approach to SM, the combination of the front- and back-end innovation process. Indeed, we could explore new models with the gathered data.

GENERAL DISCUSSION

Nowadays social media are omnipresent. They are not only part of an individual's life, but also affect the operation of economies. Modern economies are service innovation systems that are user based. In general, the phenomenon of SM coevolves with society, which innovates through the interaction between the physical and digital economies. Certain (mainly routine-based) physical mechanisms of exchange in the economy are replaced with digital mechanisms, which the SM user is part of. Consequently, SM power unseen interactions during service innovation.

We know that companies are leveraging users not just to deliver services, but also for information provision in the innovation process. However, the encounters between the user and the company's employees can hinder or propel the innovation, especially in service innovation networks. In this case, two factors are critical: 1) the role of users' experience, and; 2) the process of elaborating information about users' needs into shared understanding in the provider's organization. In this thesis we have researched the role of the SM user in service innovation and in the following subsections we present its theoretical and practical contributions, including agenda for future research.

Theoretical contributions

SM are operating in modern service economies that are challenged with the performance and innovation gaps. Different theoretical perspectives are adopted to observe and narrow the gaps in service innovation from technological and non-technological innovation. Recently the synthesis of both is gaining ground, in combination based on experience of value in use. It is exactly such multidimensionality, involving user innovation, that reveals different trajectories with different dynamics in service innovation.

With regard to multidimensionality of service innovation and SM, we synthesize user-based service innovation with technological and non-technological specificities. *This is our first theoretical contribution*. In this case we see how the SM integration hypothetically reveals embodied knowledge specificities with implications for the performance and innovation gaps. Knowledge accumulation may be captured with SM-supported user-based innovation indicators with which we can observe knowledge from different contexts and irreversible learning processes in terms of technological, social and economic interactions.

Indeed, the integration of SM and service innovation with the user is feasible with(in) the UBSI concept. In this way we identify and leverage the technological and non-technological innovation specificities, including embodied knowledge where we acknowledge and support the hypothesis with regard to the interactional innovation in service economy as suggested by other scholars. The implication is that with the UBSI concept we are able to narrow the performance and innovation gaps in service economies with SM. To do this in a systematic manner, we developed a system with different elements of value in communication, market and dynamics of service innovation networks across different sectors. *This is our second theoretical contribution*. Due to the system's attributes we comprehend the specificities of SM, especially with regard to service innovation. However, we recognize the gap between the SM interactions and interactions that occur in service innovation networks across different sectors.

We narrow the gap using the interactional service innovation with the user of SM; indeed, our interactional service model was created for this purpose. *This is our third theoretical contribution*. The functions of the model are the result of the integrated theories. Firstly, we define the function for the creation of SM innovation. Secondly, we define the function to defend the innovation process structure with the destruction of SM innovation, because the SM innovation may not always be beneficial for the organization. However, we define the function to align the creation and destruction of the SM innovation over time in a process consisting of different phases. In this case we leverage the co-production and/or co-creation of value with the SM during service innovation.

The results unfold that SM are approached with a combination of different strategies. The information from the SM can be structured into the innovation process and organizations seek to capture innovation also with the user of SM. However, the organizations may not always comprehend SM innovations due to lack of certain (organizational) capabilities. Consequently, they may destroy certain information to attempt to sustain SM innovation. We theorize different hypotheses with regard to the interactional service innovation with the SM. The results of the quantitative research provide significant support for the idea that interactional service innovation with the user of SM is defendable. *This is our fourth theoretical contribution*.

Practical contributions

The practical contributions of our research are described as benefits, advantages, practical applications, and managerial implications. The main *benefit* of our research is its originality. Although the research in terms of SM is increasing, not much research has been done with regard to service innovation. Scholars have suggested several challenges in service innovation, including the interactivity with the user. However, we have investigated this from the SM perspective. For instance, in our research we inherently consider the involvement of users (SM) in service innovation. We observe this from the systematic perspective, leading to the model of interactional service innovation with the user of SM.

The *advantage* of this research is not only recognition of the interactional opportunities of service innovation with the SM, but also the conceptualization of the systematic framework where other interactional models could be leveraged. In this case we leverage the omnipresence of the SM user in terms of what resides in a human's mind and go beyond the technological innovations, as the subject of a "typical" information-processing strategy of decentralized networks (e.g. Internet) of the digital economy. Consequently, we leverage the integration of relationships and encounters in different contexts and capture simple and complex service innovations across different sectors. To our knowledge no such systems with regard to SM exist.

The *practical application* of our work unfolds the future research programme and application in the economy. With regard to the application in the economy we suggest the following. Companies can integrate the UBSI concept with the interactional service innovation with the SM across different sectors. There are several ways in which different forces of the UBSI concept could be leveraged in practice. However, a good example is to use a particular strength of the UBSI concept and focus on its application. For instance, if the functional economy is seeking husbandry of goods, companies could leverage the SM user with the aim to interact with a good. The SM user would have an established interaction with a good, while each good would unfold certain specifics that are important in the economy at large, e.g. advanced through user experiences and co-creation. In this case, companies could observe each good as an object with regard to the context and certain specifics that are trending among the SM users. Someone could

quickly envisage different interactions among the objects and manage the relationship of the interactional service innovation with the SM user in/for particular contexts.

With regard to the research programme, further explorations could be made of the systematic framework from the perspective of different roles of users and their contexts in service innovation. In this case, different streams of research could be developed. Firstly, with the use of our system different service innovation interactions from different contexts with the integration of the SM users' roles could reveal new methods of co-creation during service innovation. Secondly, the interactional model could be leveraged to clarify the dynamics and trajectories of service innovation with regard to a particular relationship of co-creation or co-production. Thirdly, the research programme could focus more attention on quantitative studies. For instance, variables from different contexts could be integrated to measure service innovation with regard to SM.

The *managerial implications* are how SM put more power in the hands of those smaller, more niche parts of organizations around the globe at large. This reveals different contexts and interactions with intrinsic integration of embodied knowledge. Today users have an ability to impact the culture regardless of an organization's size – the ability to trend and be seen. Additionally, because different companies are continuing to build cooperative opportunities, they are trying to give people a better chance to be heard and to further amplify their voice. SM are powerful in giving a voice to previously unheard people.

As explored in this thesis, companies can leverage this power with active SM interactions. For instance, they can offer a service/product/good/system of value experiences, etc. with interactions also through SM. In this case, companies can define their product as a "social medium", an intervening substance that enables their customers to integrate as users and interact between physical and digital environments. In some of our case studies we have observed the notions of *"sharing" or "liking" the product's features (rather than pictures of the products only) from particular contexts with SM. However, such features should seek and evolve further into experiences and design of transformations that are hard to commoditize. In the future we can expect to see how different contexts will also arise due to unseen interactions spurred by SM.*

Although we always had a chance to decide about the adoption of technology, now companies cannot ignore the technology of SM because otherwise they will miss the

integration of interactions in innovation which today already present more than 70% of employment and added value, while the demand for services is 50% of overall final demand. However, there are also other unseen interactions that are challenging in advanced economies around the globe due to the power of interactivity. We assume such interactions will disperse even more into service innovation networks across different sectors with the SM. In this case companies have an opportunity, not just to capture yet unseen interactions with SM, but also harness them and seek not only co-production, but also co-creation, of value with the user of their services, products or goods to their competitive advantage. Such a collaborative future is imperative in service innovation with the user of SM.

Conclusion and agenda for future research

This thesis identifies the integration of the SM user during service innovation. With regard to SM the investigation was from technological, social and economic perspectives. The results indicate that SM present different interaction costs that seek to counteract social and economic failures. This impacts the output of service innovation. With regard to service innovation different theoretical perspectives, from adoption of technology to service innovation synthesis, including user involvement in the co-production and co-creation (experience) relationship, were researched. Due to the lack of conceptualization of service innovation with the user of SM, I had to develop the systematic framework and interactional model of service innovation with the user of SM, for which I have found significant support.

The SM is evolving with societies; making certain processes of consumption and exchange in economy around the globe “invisible”. Such SM activities are emerging with positive and negative consequences for individuals, firms and societies. These are interactions that manifest themselves with or without technology, with (new) costs between physical and digital economies generated by social experiences and collective intelligence. The user of SM interacts in co-production and co-creation of value during service innovation based on knowledge, observed also as experiences and shared understanding of information within the organization. This study reveals a system of SM innovation with dynamics of service innovation networks across different sectors and contexts. We argue that each product or service is involved with SM innovation; entanglement of a particular relationship between the user and organization in different trajectories and dynamics of interactional service innovation with the user of SM.

Although the interactional service innovation with the SM is identified, there is still plenty of work to be done. For instance, future research should investigate the major shortcomings of this research and investigate the ways to improve it; as indicated above. This should involve the conceptualization of the user in service innovation with interactions across different contexts that are possible, for example with the SM and the UBSI concepts. The use of the system and UBSI concept is promising in future research.

We open several avenues of future research with identification of different shortcomings. Although the methodology adopted in this research is appropriate to explore the phenomena of SM, more quantitative studies are required. For instance, in the first step of our methodology we have identified certain organizational specifics that we have not quantitatively observed in a larger sample. This is an actual shortcoming of improving the measuring tool, namely the questionnaire. Another shortcoming is advancement of particular SM specifics in the organization, which we could address with regard to the relationship of co-creation (which is important in deriving experiences with the users). For instance, SM enable enormous interactions that companies can use at large and which could be investigated further from the perspective of particular contexts.

Although the UBSI concept is leveraged with our system, this concept should be further/more integrated into it, especially from the perspective of users' capabilities in terms of different contexts. With regard to experiences this is a major shortcoming in our research, leading to limitation in user co-creation. For instance, we have addressed service innovation with the user of SM, but we have not explored the potential issues that may occur in such interactions. The interactions with the user in service innovation pose serious difficulties in costs estimation and problems of appropriation. These issues and problems are crucial in the relationship between the firm and user, especially in regard to innovation. Consequently, this may be another gap in our research that could be investigated further.

One major shortcoming of our research is the concern of privacy with regard to interactions in the emerging digital economies in general. This research does not integrate any of the privacy issues. For instance, the system emerging from this research may have problems integrating interactional service innovation with the user of SM without proper integration of the pertinent issues in the process of service innovation

and SM user involvement. One of the major drawbacks with regard to the organization is that certain SM disadvantages may break down the contexts under investigation. Needless to say this is a concern for future research.

Our research mainly highlights service specificities of interactivity and intangibility with the SM. Although we have identified the interactional model that narrows the gap in service innovation networks across different sectors, we are still missing how this model explains different innovations in different relationships with the user of SM. This should entail investigation of different dynamics and trajectories. For example, different innovation types may have different thrusts in innovation based on information and knowledge. Such dynamics and trajectories of the interactional service innovation with the user of SM would clarify how organizations should start and continue innovating with the SM. Currently our research is limited in this regard.

With regard to the interactional model of service innovation with the SM, the research unfolds two implications. Firstly, the sustainability of service innovation with the SM is dependent on the capabilities of the organization and user. This inevitably involves certain SM specifics with a particular strategy to sustain the SM innovation. On the one hand, certain specifics are essential for the co-production or co-creation of value with the SM. On the other hand, the specifics reflect in a particular strategy that follows the analysis and implementation phase of the organization. Secondly, with the use of our model, organizations can reduce the costs and constraints of the innovation process, namely identify the need-solution pair with the user of SM. The innovation process may involve considerable costs (associated with the problem formulation) and constraints (associated with the possible solutions that problem formulation requires) and scholars argue that identification of the need-solution pair reduces the costs and constraints of the innovation process (von Hippel & von Krogh, 2013).

Despite having conceptualized the notion of SM interactions on a systematic level we only reveal one potential configuration of the system. The future research should explore more configurations. For instance, due to the conceptualization of the system we can leverage infinite regressions of different contexts with SM. Consequently we could identify and explore other interactions of service innovation (also with the SM). Furthermore, the UBSI concept leverages the characteristics-based approach, with certain implications. For instance, it may be challenging to comprehend the complexity of SM interactions, because such an approach to service innovation depends on a theory

that may not follow the complexity of SM. Needless to say, future research should investigate the significance of this implication with the complexity of SM in mind.

The emergence of unseen interactions in the digital economy is not only widening the performance, but also the innovation, gap in services. The user-based indicators that are based on SM interactions counteract the innovation gap in the digital economy to some degree. Although the possible indicators to narrow the innovation gap with SM are identified, future research should investigate the impact/implication of SM on performance; namely that SM indicators could be developed with potential for narrowing the performance gap with regard to service innovation with the user of SM by seeking "unseen" interactions, for example.

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APPENDICES

LIST OF APPENDICES

Appendix A: R code for the application programming interface

```
####
# Code for the application programming interface:
# Crunchbase
#
# Author: Miha Uratnik
# Reference (Shah, 2015)
# Ljubljana, Lille, 2014
####

# my Crunchbase API key
cb_api_key <- "YOUR API KEY"

# load required packages
library(devtools)
devtools::install_github("tarakc02/rcrunchbase")
library(rcrunchbase)
library(rjson)
library(httr)

# get
someNames_locations  <- crunchbase_GET("locations")
#first 1000
someNames_organizations <- crunchbase_GET("organizations")
#second 1000
someNames_organizations_1 <- crunchbase_GET("organizations", page = 1)

# parse
someNames_locations   <- crunchbase_parse(someNames_locations)
someNames_organizations <- crunchbase_parse(someNames_organizations)

# an example (Facebook) of current team "details"
# get Facebook organization data
fb <- crunchbase_GET("organization/facebook/")

# parse FB data
fb <- crunchbase_parse(fb)

# expand FB data with "current team"
fb_current_team <- crunchbase_expand_section(fb, "current_team")

# function to get the name of the each person in current_team
z <- function(x) {x$path}
# apply the function on current_team
fb_current_team_each_person <- z(fb_current_team)
# get details about each person in the Facbook current team
fb_current_team_each_person_details <-
crunchbase_get_details(fb_current_team_each_person)

fb_current_team_strip <-
crunchbase_strip_list(fb_current_team_each_person_details) # access to
data about each person of the Facebook's current team
```

```
# download web details of "certain" organization (CB database)
# First 1000 organizations, since there is no specification, such as
page = 1; 2, etc.
#

all_orgs <- crunchbase_get_collection("organizations")

# store 100 orgs
# add the packages for '%>%' forward pipe operation: magrittr
# install, library ...

install.packages("magrittr")
library(magrittr)

all_org_100_300 <- all_orgs[0:100, ]
%>% crunchbase_get_details
%>% crunchbase_expand_section("current_team")
%>% crunchbase_get_details
%>% crunchbase_expand_section("websites")

# store particular web detail of those 100 orgs

all_org_100_tw <- subset(all_org_100, title == "twitter")
all_org_100_lnkdin <- subset(all_org_100, title == "linkedin")
all_org_100_fb <- subset(all_org_100, title == "linkedin")

# (ok, but there are duplicates in the $url) show only unique data

# more data than with the fb
all_org_100_tw <- unique(all_org_100_tw)

# most resourceful data of the 100 orgs
all_org_100_lnkdin <- unique(all_org_100_lnkdin)

# not much data here?
all_org_100_fb <- unique(all_org_100_fb)
```

Appendix B: R code for the design and evaluation of the final model

```
####
# Code for the design and evaluation of the final model:
# descriptive statistics, factor analysis, including PCA and CFA
#
# Reference: See Chapter 5 for the references about the packages used
# Author: Miha Uratnik
# Ljubljana, Lille, 2015
####

# set working directory
setwd("your folder") # where you have the data
SM_data <- read.csv(SM_data.csv, sep=";")

# my data
SM_data

###
# Descriptive statistics
###

# sum of the NA numbers in our data sample
sum(is.na(SM_data))

# plot missing value matrix
library(VIM)
matrixplot(SM_data, xlab = "Observed variables - items", ylab =
"Number of respondents")
aggr(SM_data, plot = TRUE)

SM_data_NA <- SM_data

library(mice)
library(VIM)
library(lattice)
library(ggplot2)

# my data
SM_data_NA <- SM_data
#

# identifiying missing data patterns
md.pattern(SM_data_NA)

# number of observations per patterns for all pairs of variables
#
# the pattern rr represents the number of observations where both
pairs of values are observed.
# the pattern rm represents the exact opposite, these are the number
of observations where both variables are missing values.
# the pattern mr shows the number of observations where the first
variable's value (e.g. the row variable) is observed and second (or
column) variable is missing.
# the pattern mm is just the opposite.

p <- md.pairs(SM_data_NA)
p

###
# Missing data visualization
###
```

```
# margin plot of SM_data_NA; must be two dimensional
marginplot(SM_data_NA[c(1,6)], col = c("blue", "red", "orange"))
# distributions of missing variable by another specified variable
pbox(SM_data_NA, pos = 2) # referring to the second column

#
# imputation
#

# by default it does 5 imputations for all missing values
imp1 <- mice(SM_data_NA, m = 5, diagnostics = T, seed = 1)

# Inspect the multiple imputed data set
imp1 # put in as an appendix
# all of the observed variables can be inspected individually
imp1$imp$i1
imp1$imp$i2 #... and so on

# from the observation we can see that all of our missing values were
imputed;
# the value of either obaserved variables is not missing anymore.
# with the complete function of mice we combine that orginal and
imputed data
# We will make our data long by stacking or appending our five imputed
datasets and
# then we will use the inc=TRUE argument to specify we also want to
append our observed original data.
# note: This "long" dataset is now in a format that can also be used
for analysis in other statistical packages including SAS and Stata.

imp_tot2 <- complete(imp1, "long", inc=T)

# we inspect the original and imputed data
# labels observed data in blue and imputed data in red for i3
col <- rep(c("blue", "red")[1 + as.numeric(is.na(imp1$data$i3))], 6)
# plots data for i1 by imputation
stripplot(i3 ~ .imp, data = imp_tot2, jit = TRUE, col = col, xlab =
"imputation Number")

# use the imputed data
library(psych)
describe(SM_data_imp)

# export correlation matrix
install.packages("Hmisc")
library(Hmisc)

cor_1 <- rcorr(as.matrix(SM_data_imp), type="spearman")
cor_1 <- cor(SM_data_imp, method="spearman")
cor_1

xtable(cor_1)
xtable(cor_1$P) #P value
xtable(cor_1$r) #spearman rho rank coefficients for all possible pairs
of a matrix

# plot correlation matrix
install.packages("corrplot")
library(corrplot)

cor_spear_mat <- cor(SM_data_imp, method="spearman")
```

```
# drawing different correlation matrixes
corrplot(cor_spear_mat, method = "circle", type = "full", tl.pos="lt",
tl.col="red", tl.cex=3, tl.srt=1, addCoef.col="black",
addCoefasPercent = F)
corrplot(cor_spear_mat, method = "pie" , type = "full", tl.pos="lt",
tl.col="red", tl.cex=1.5, tl.srt=1, addCoef.col="black",
addCoefasPercent = F)
cor_spear_mat <- round(cor_spear_mat, digits = 2)
cor_spear_mat
# export as csv file
write.csv(cor_spear_mat, "/Users/imac27/Desktop/SM_corr_mat.csv")


###
# Factor Analysis (FA)
#
# Reference: R practice: Factor Analysis
(http://minato.sip21c.org/swtips/factor-in-R.pdf, accessed, January,
2015)
#
###

# quick inspection of the apparent factor structure e.g. EFA
factanal <- factanal(SM_data_imp, factors=3)
factanal

# Cronbach alpha e.g. alpha below 0.7
https://www.researchgate.net/post/Cronbachs_alpha_below_07
install.packages("psych")
library(psych)
alpha <- alpha(SM_data_imp)

alpha

xtable(alpha$alpha.drop) #P value

# checking adequacy of factor analysis with Kaiser-Meyer-Olkin's
sampling adequacy criteria & Bartlett's sphericity test!

# KMO
kmo <- function(x)
{
  x <- subset(x, complete.cases(x)) # Omit missing values
  r <- cor(x) # Correlation matrix
  r2 <- r^2 # Squared correlation coefficients
  i <- solve(r) # Inverse matrix of correlation matrix
  d <- diag(i) # Diagonal elements of inverse matrix
  p2 <- (-i/sqrt(outer(d, d)))^2 # Squared partial correlation
coefficients
  diag(r2) <- diag(p2) <- 0 # Delete diagonal elements
  KMO <- sum(r2)/(sum(r2)+sum(p2))
  MSA <- colSums(r2)/(colSums(r2)+colSums(p2))
  return(list(KMO=KMO, MSA=MSA))
}

KMO(SM_data_imp)

# Bartlett
Bartlett.sphericity.test <- function(x)
{
  method <- "Bartlett's test of sphericity"
  data.name <- deparse(substitute(x))
  x <- subset(x, complete.cases(x)) # Omit missing values
```

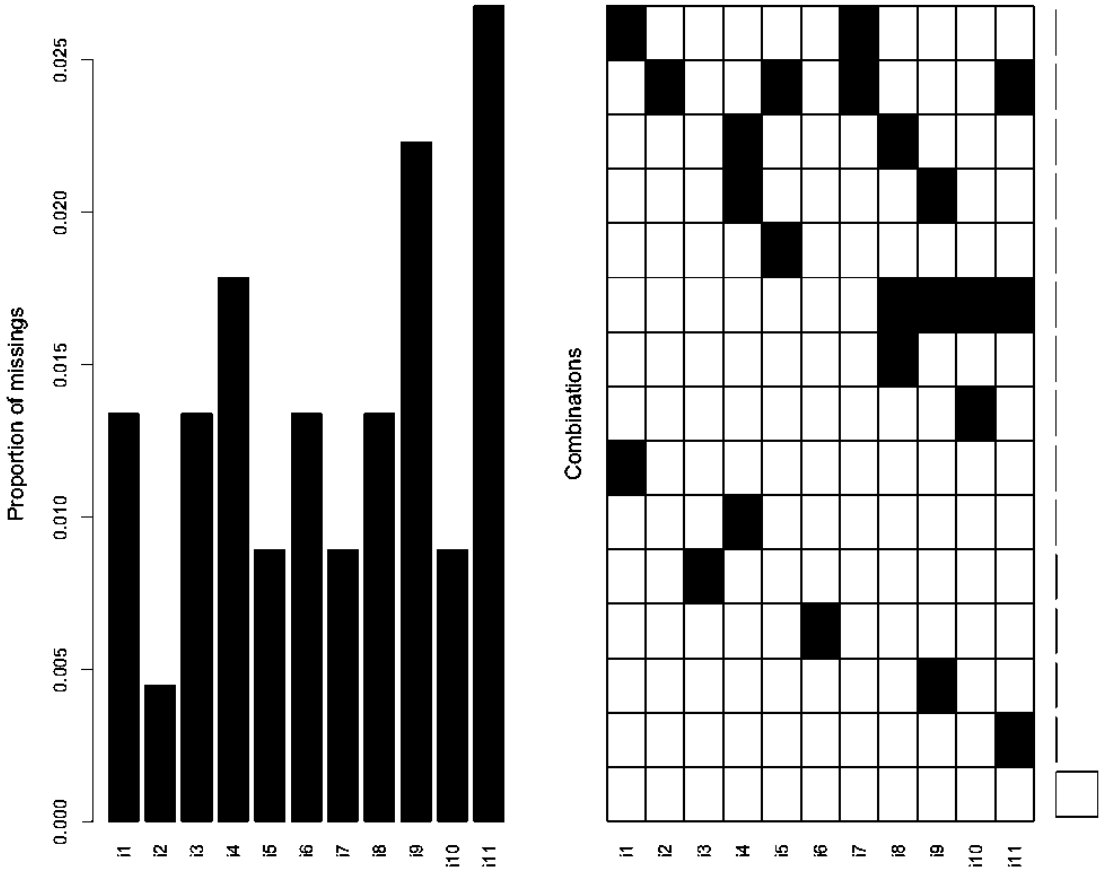
```
  n <- nrow(x)
  p <- ncol(x)
  chisq <- (1-n+(2*p+5)/6)*log(det(cor(x)))
  df <- p*(p-1)/2
  p.value <- pchisq(chisq, df, lower.tail=FALSE)
  names(chisq) <- "X-squared"
  names(df) <- "df"
  return(structure(list(statistic=chisq, parameter=df,
p.value=p.value,
                        method=method, data.name=data.name),
class="htest"))
}

Bartlett.sphericity.test(SM_data_imp)

###
# Principal component analysis (PCA)
###

pca <- princomp(SM_data_imp, scores=TRUE, cor=TRUE)
pca <- princomp(imputed_data, scores=TRUE, cor=TRUE)

pca_sum <- summary(pca)

cor=cor(SM_data_imp, method="spearman"); cor # Correlation matrix
(Spearman)

E=eigen(cor); E
eig<-E$values; eig
eig_=mean(eig); eig_
components=1:ncol(SM_data_imp)
plot(x=components, y=eig, type="b", main="Scree diagram", col="blue")


###
# Confirmatory Factor Analysis (CFA)
###

install.packages("lavaan")
install.packages("semPlot")
install.packages("semTools")
library(lavaan)
library(semPlot)
library(semTools)

# APP factor
SM_CFA_APP <- " APPRSM  =~ i1 + i2 + i3 + i4 "
SM_CFA_APP_fit <- cfa(SM_CFA_APP, data=SM_data_imp); SM_CFA_APPRSM_fit

summary(SM_CFA_APP_fit, fit.measures = T)

semPaths(SM_CFA_APP_fit, what="std", style = "lisrel", color= 15,
fade=T, residuals=T, edge.label.cex=1, intercepts=F)

# INN factor
SM_CFA_INN <- " INN  =~ i5 + i6 + i7 "
SM_CFA_INN_fit <- cfa(SM_CFA_INN, data=SM_data_imp); SM_CFA_INN_fit

summary(SM_CFA_INN_fit, fit.measures = T)

semPaths(SM_CFA_INN_fit, what="std", style = "lisrel", color= 15,
fade=T, residuals=T, edge.label.cex=1, intercepts=F)
```

```
# ORG factor
SM_CFA_ORG <- " ORG   =~ i8 + i9 + i10 + i11 "
SM_CFA_ORG_fit <- cfa(SM_CFA_ORG, data=SM_data_imp); SM_CFA_ORG_fit

summary(SM_CFA_ORG_fit, fit.measures = T)

semPaths(SM_CFA_ORG_fit, what="std", style = "lisrel", color= 15,
fade=T, residuals=T, edge.label.cex=1, intercepts=F)

# CFA model (all)

SM_CFA_model_all_fit <- cfa(SM_CFA_model_all, data=SM_data_imp);
SM_CFA_model_all_fit

summary(SM_CFA_model_all_fit, fit.measures = T)

semPaths(SM_CFA_model_all_fit, what="std", style = "lisrel", color=
15, fade=T, residuals=T, edge.label.cex=1, intercepts=F)

# CFA model (original)

SM_CFA_model <- "APP  =~ i1 + i2 + i3 + i4
                         INN =~ i5 + i6 + i7
                         ORG   =~ i8 + i9 + i10 + i11
                         APP ~~ INN
                         APP ~~ ORG
                         INN ~~ ORG "

SM_CFA_model_fit <- cfa(SM_CFA_model_original, data=SM_data_imp,
missing = "default"); SM_CFA_model_fit

summary(SM_CFA_model_fit, fit.measures = T)

semPaths(SM_CFA_model_fit, what="std", style = "lisrel", color= 15,
fade=T, residuals=T, edge.label.cex=1, intercepts=F)


# quick summary
fitMeasures(SM_CFA_APP_fit, c("chisq","df","pvalue", "cfi", "rmsea"))
# try fit.measures = "all"
fitMeasures(SM_CFA_INN_fit, c("chisq","df","pvalue", "cfi", "rmsea"))
# try fit.measures = "all"
fitMeasures(SM_CFA_ORG_fit, c("chisq","df","pvalue", "cfi", "rmsea"))
# try fit.measures = "all"

fitMeasures(SM_CFA_model_fit, c("chisq","df","pvalue", "cfi",
"rmsea"))
fitMeasures(SM_CFA_model_correlations_fit, c("chisq","df","pvalue",
"cfi", "rmsea"))

###
# PCA
###


pca <- princomp(SM_data_imp, scores=TRUE, cor=TRUE)

summary(pca)

cor=cor(SM_data_imp, method="spearman"); cor # correlation matrix
Spearman

E=eigen(cor);E # eigen values
```

```
eig<-E$values; eig # values
eig_=mean(eig); eig_ # values average
components=1:ncol(SM_data_imp)
plot(components,eig, type="b", main="Scree diagram", col="blue")

###
# Hypotheses tests
###

# App <-> Org

library(PerformanceAnalytics)

H1 <- data.frame(SM_data_imp$i1, SM_data_imp$i2, SM_data$i3,
SM_data$i4, SM_data$i8, SM_data$i9, SM_data$i10, SM_data$i11)
chart.Correlation(H1, histogram=F, method="spearman",  main =
"Hypothesis 1", pch=1)
cor(H1, method = "spearman")

cor.test(SM_data$i1, SM_data$i8, method = "spearman", conf.level =
0.95, exact = F)

# App <-> Inn
H2 <- data.frame(SM_data$i5, SM_data$i6, SM_data$i7, SM_data$i8,
SM_data$i9, SM_data$i10, SM_data$i11)
chart.Correlation(H2, histogram=F, method="spearman", main =
"Hypothesis 2", pch=1)
cor(H2, method = "spearman")

# Inn <-> Org
H3 <- data.frame(SM_data$i1, SM_data$i2, SM_data$i3, SM_data$i4,
SM_data$i8, SM_data$i9, SM_data$i10, SM_data$i11)
chart.Correlation(H3, histogram=F, method="spearman",main =
"Hypothesis 3", pch=1)
cor(H3, method = "spearman")

H3a <- data.frame(SM_data$i1, SM_data$i2, SM_data$i10, SM_data$i11)
chart.Correlation(H3a, histogram=F, method="spearman",main =
"Hypothesis 3a", pch=1)
cor(H3, method = "spearman")

# correlation matrix
cor(H3, method = "spearman")

# seek values
library(PerformanceAnalytics)
chart.Correlation(SM_data_final_1_1, histogram=F, pch=1)

# test of individual correlations
cor.test(SM_data$i1, SM_data$i5, method = "spearman", conf.level =
0.95, exact = F)
cor.test(SM_data$i3, SM_data$i8, method = "spearman", conf.level =
0.95, exact = F)

# the chart.Correlation() function from PerformanceAnalytics package
can display a chart of the correlation matrix.
# the histograms of the variables are shown on the diagonal.
# the asterisks indicate the significance levels of the correlations.

table.Correlation(H1, histogram=T, pch=19)
chart.RollingCorrelation(H1)
```

Appendix C: Missing values of data sample

Figure 26: Missing values of data sample



Note: Number of missing values for a data sample. LEFT: Barplots for the number of missing values in each variable. RIGHT: Aggregation plot showing all combinations of missing (black) and non-missing (white) parts in the observations, and the corresponding frequencies.

Appendix D: Questionnaire

Interactional service innovation with social media

Final (short) version.

Introduction

Dear social media user and innovator,

This is the final study of the social media and service innovation. I kindly invite you to answer the questions given below. When you are not sure about the answer just skip the question.

Your feedback will be instrumental to test the theory for the PhD, so I would be glad if you could dedicate 5 minutes of your time to complete this survey.

All data given will be treated with the utmost confidentiality, so I invite you to be absolutely honest.

Many thanks in advance for your valued input!

Kind regards,
Miha Uratnik

Social media 1

1. **Active participation on social media is very important to me.**
   Mark only one oval.

   - Strongly disagree
   - Neither agree nor disagree
   - Strongly agree

Social media 2

2. **I am very interested in designing products with social media**
Mark only one oval.

- Not true for me
- Somewhat true for me
- True for me

Social media 3

3. **I use social media only to obtain information.**
Mark only one oval.

- Not true for me
- Somewhat true *Skip to question 5.*
- *Skip to question 5.*
- Very true for me

Social media 4

4. **User profiling and other content analysis on social media are very important to me.**
Mark only one oval.

- Not true for me
- Somewhat true
- True for me

Social media and information

5. **Is interaction with social media important for innovation?**
   Mark only one oval.

   - Not true for me
   - Somewhat true
   - True for me

6. **Would you agree that you provide information about needs and preferences on social media?**
   Mark only one oval.

   - Strongly disagree
   - Neither agree nor disagree
   - Strongly agree

7. **Would you agree that you provide technical solutions on social media?**
   Mark only one oval.

   - Strongly disagree
   - Neither agree nor disagree
   - Strongly agree

Social media and organization

Information about you!

Your feedback is instrumental to test the theory. In addition, all data given will be treated with the utmost confidentiality.

12. **What is your professional role?**

Please choose maximum three roles.
Check all that apply.

- [ ] Professor or other academic role
- [ ] Community manager
- [ ] CEO (a chief executive officer)
- [ ] Project manager
- [ ] Programmer
- [ ] CMO (a chief marketing officer)
- [ ] CTO (a chief technology officer)
- [ ] Other: .....

13. **From which part of the world are you?**

Mark only one oval.

- ◯ America
- ◯ Africa
- ◯ Asia
- ◯ Europe
- ◯ Other: .....

14. **What is usually the financial scope of the project where social media is involved?**

Companies use social media for different purposes in marketing, development, etc. Usually, the projects have a financial scope. Note: we are not interested about the money spent on use of social media in a particular project, but rather the budget of the project where social media is involved. If this question is not relevant for you, please continue without the answer.
Mark only one oval.

- ◯ below or equal to 1k EUR
- ◯ above 1k, but not more than 20k
- ◯ above 20k, but not more than 50k
- ◯ above 50k, but not more than 100k
- ◯ above 100k
- ◯ I prefer not say

15. **Within the past few months, how frequently did you use social media?**

Mark only one oval per row.

	Never	Once	Twice
Daily	◯	◯	◯
Weekly	◯	◯	◯
Monthly	◯	◯	◯

16. **What social media do you use (or you have used) mostly?**
Mark only one oval.

- ◯ Facebook
- ◯ LinkedIn
- ◯ Twiiter
- ◯ Other: .....

17. **Is the questionnaire too long?**
Mark only one oval.

- ◯ No
- ◯ Yes

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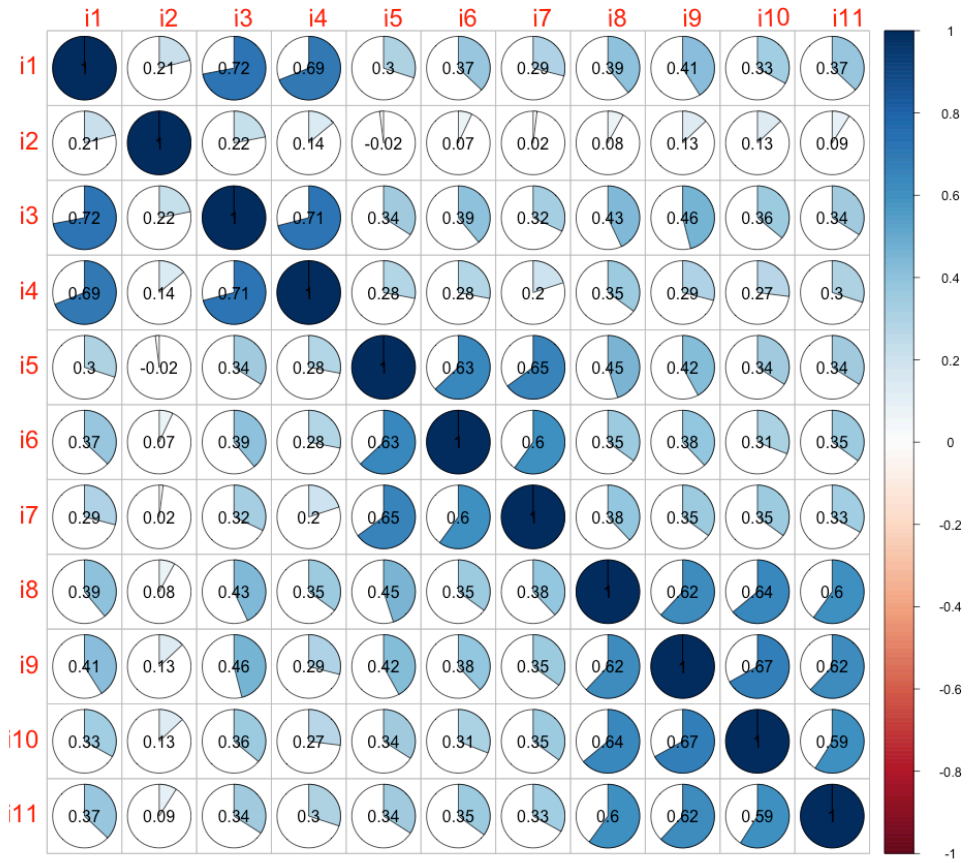
Google Forms

Appendix E: Statistics of data sample

Table 24: Spearman's rank coefficients of all possible pairs of our data[50]

	i1	*i2*	*i3*	*i4*	*i5*	*i6*	*i7*	*i8*	*i9*	*i10*	*i11*
i1	1	0.21	0.72	0.69	0.3	0.37	0.29	0.39	0.41	0.33	0.37
i2	0.21	1	0.22	0.14	-0.02	0.07	0.02	0.08	0.13	0.13	0.09
i3	0.72	0.22	1	0.71	0.34	0.39	0.32	0.43	0.46	0.36	0.34
i4	0.69	0.14	0.71	1	0.28	0.28	0.2	0.35	0.29	0.27	0.3
i5	0.3	-0.02	0.34	0.28	1	0.63	0.65	0.45	0.42	0.34	0.34
i6	0.37	0.07	0.39	0.28	0.63	1	0.6	0.35	0.38	0.31	0.35
i7	0.29	0.02	0.32	0.2	0.65	0.6	1	0.38	0.35	0.35	0.33
i8	0.39	0.08	0.43	0.35	0.45	0.35	0.38	1	0.62	0.64	0.6
i9	0.41	0.13	0.46	0.29	0.42	0.38	0.35	0.62	1	0.67	0.62
i10	0.33	0.13	0.36	0.27	0.34	0.31	0.35	0.64	0.67	1	0.59
i11	0.37	0.09	0.34	0.3	0.34	0.35	0.33	0.6	0.62	0.59	1

Figure 27: Graphical presentation of the Spearman's correlation matrix[51]



[50] Everything above value 0.7 or 70% is considered as strong correlation; everything between 0.4 or 40% to 0.7 or 70% represents moderate correlations; everything under 0.4 or 40% indicates weak correlations, while everything under 0.2 or 20% indicates very weak correlation.

[51] idem.

Table 25: Kaiser-Meyer-Olkin and Bartlett's tests[52]

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.87
Bartlett's Test of Sphericity	*Approx. Chi-Square:*	1293
	df	55
	Significance	0

Figure 28: Scree diagram of Principal Component Analysis

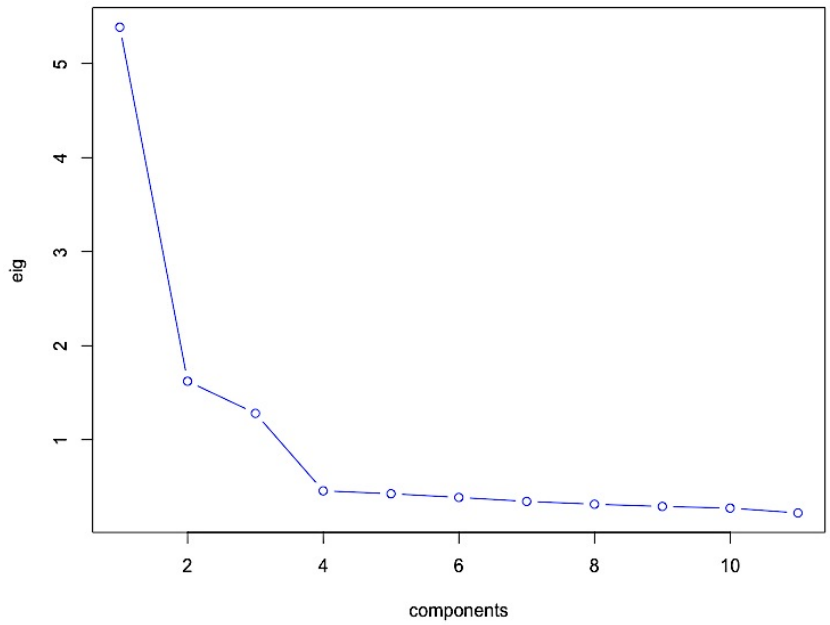


Table 26: Importance of the components and its initial eigenvalues

Component	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Proportion of Variance	0.50	0.14	0.11	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02
Cumulative Proportion	0.50	0.65	0.75	0.80	0.84	0.87	0.90	0.93	0.95	0.98	1.00
Eigenvalues	5.38	1.62	1.28	0.46	0.42	0.39	0.34	0.31	0.29	0.27	0.22
SS Loadings[53]	1.00										
Proportional Variance	0.09										

[52] See http://minato.sip21c.org/swtips/factor-in-R.pdf, accseed January, 2015.
[53] Although, we have done component analysis with R software, the tests are more or less prominent well-known statistical software SPSS. See R documentation for information, available at http://www.r-project.org/other-docs.html, accessed, January, 2015.

Appendix F: Individual construct's model

Figure 29: Approach to social media construct

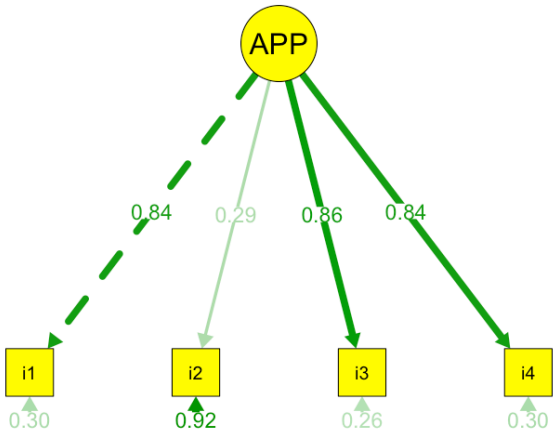


Figure 30: Innovation process construct

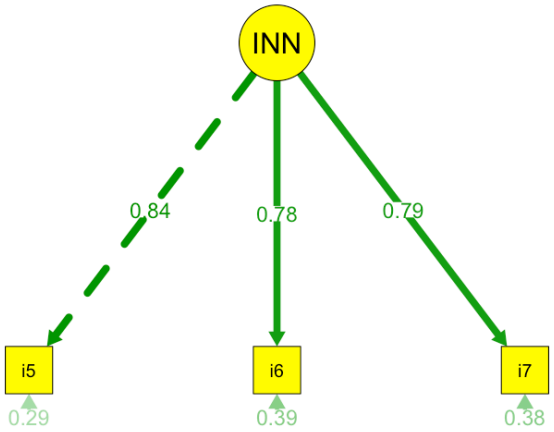
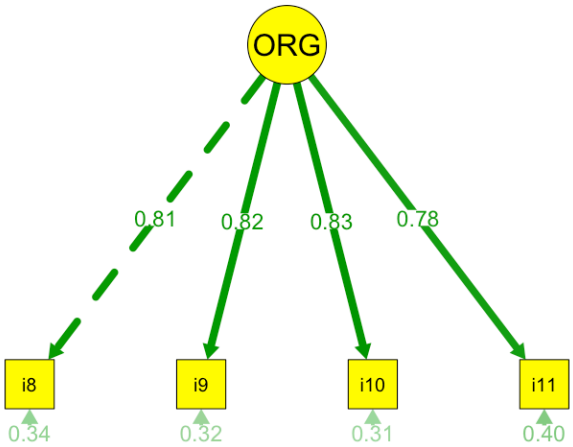
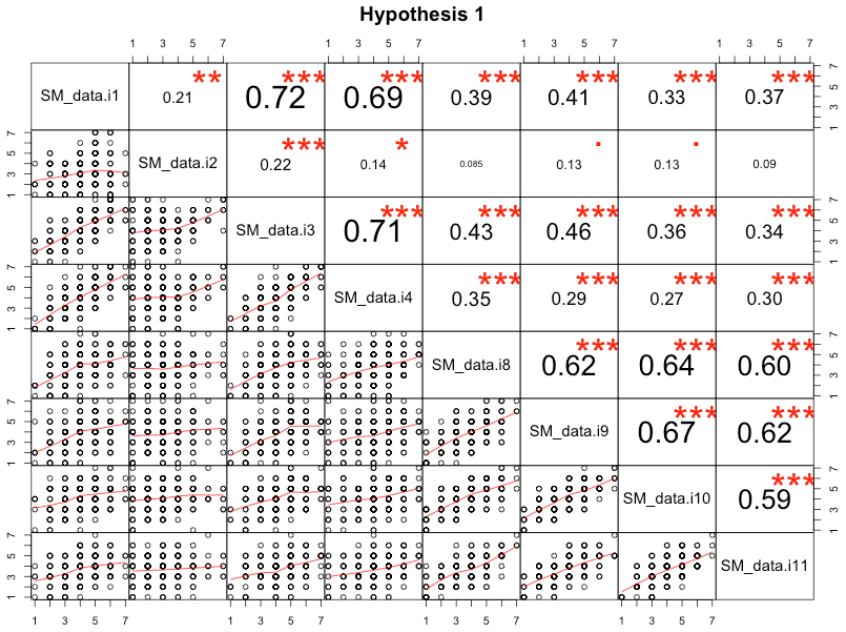


Figure 31: Organization construct



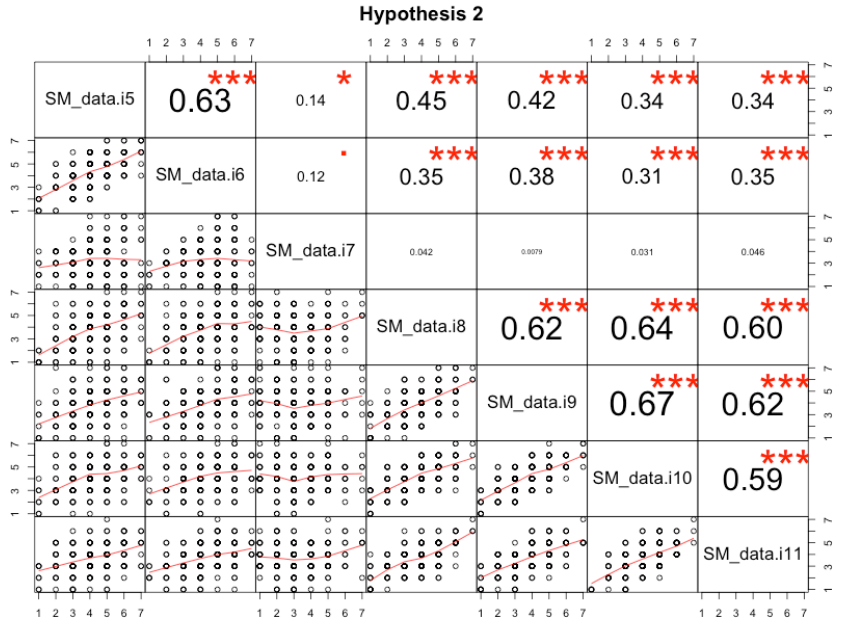
Appendix G: The hypotheses correlation matrixes

Figure 32: The correlation matrix for the Hypothesis 1



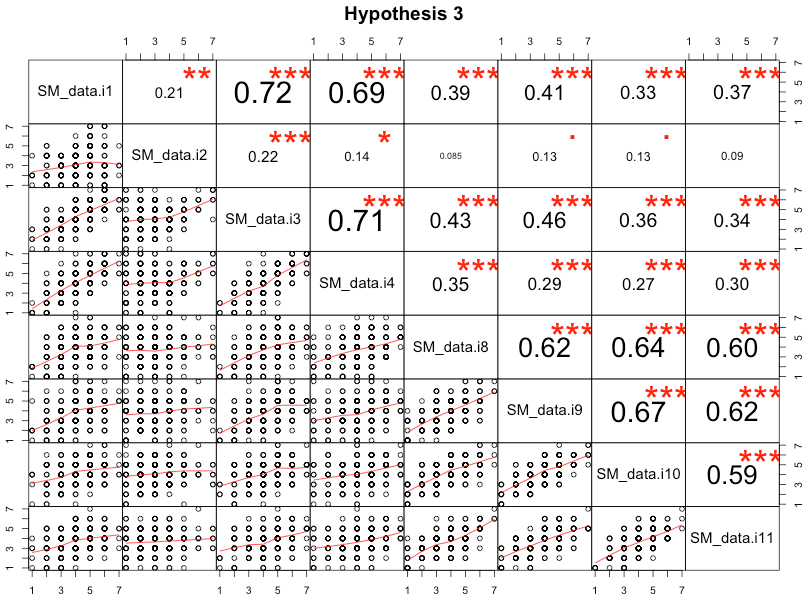
Note. * p<0.5, ** p<0.1, *** < 0.01, (one-tail significance), 0 (no effect) – 1 (a perfect effect)

Figure 33: The correlation matrix for the Hypothesis 2



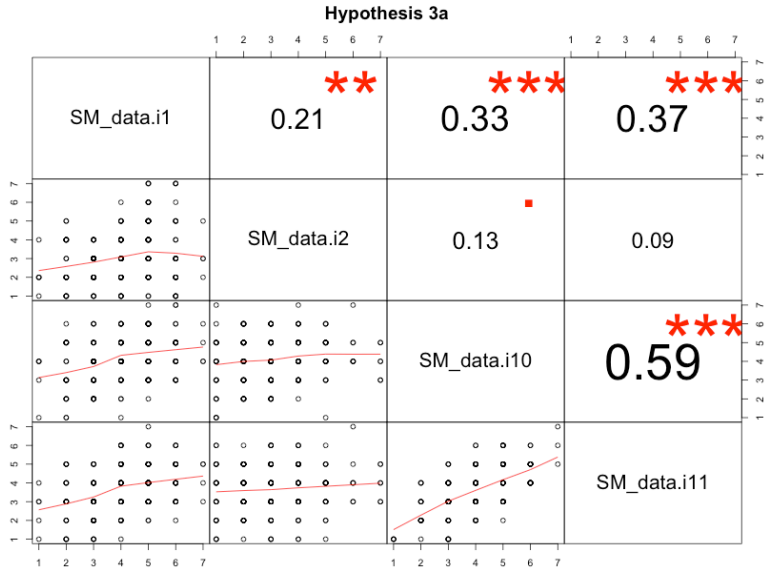
Note. * p<0.5, ** p<0.1, *** < 0.01, (one-tail significance), 0 (no effect) – 1 (a perfect effect)

Figure 34: The correlation matrix for the Hypothesis 3



Note. * p<0.5, ** p<0.1, *** < 0.01, (one-tail significance), 0 (no effect) – 1 (a perfect effect)

Figure 35: The correlation matrix for the Hypothesis 3a



Note. * p<0.5, ** p<0.1, *** < 0.01, (one-tail significance), 0 (no effect) – 1 (a perfect effect)

Appendix H: Summary in Slovenian language/Daljši povzetek v slovenskem jeziku

Kako razumeti pomen in vlogo družbenih medijev (DM) v storitvenih inovacijah?[54] V disertaciji poskušamo to razumeti z jedrnatim pregledom literature in opazovanjem hitro rastočega digitalnega gospodarstva, zlasti z upoštevanjem t. i. nevidnih interakcij. Take interakcije izhajajo iz družbenih potreb vsakdanjega življenja. Interakcije in njihova nedotakljivost so posebnosti inovacij v storitvah. Upoštevajoč tehnološki razvoj se danes lahko vprašamo, kako se uporabljajo podatki, ki jih je ustvaril uporabnik z neresnično, skrito identiteto. Skrite identitete vodijo do neresničnih uporabniških računov (točk v omrežjih) z lažnimi imeni, itd. Kljub svoji neresničnosti taki računi povečujejo število privržencev, političnih sporočil in vodijo nevidno socialno trženje. Neresnični računi na eni strani pomenijo posel, na drugi strani pa vprašanje identitete omejuje potencialne interakcije z DM zaradi zaupanja, ki ga je težko vzpostaviti brez vidnih interakcij oz. fizičnih srečanj. Fizična senzibilnost ima pomembno vlogo pri storitvenih inovacijah.

Skrite interakcije v digitalni ekonomiji se lahko preučuje z interakcijskimi inovacijami na področju storitev z uporabnikom DM, kar je predmet raziskovanja te disertacije. Z vzponom DM ter storitvenih inovacij in ob njihovi pravilni uporabi, je to lahko močna kombinacija, ki bo zmanjšala disekonomijo obsega, stroške za R&R in razkrila še nevidne/vznikajoče inovacije. V tej disertaciji opazujemo vzpon DM z uporabnikom v storitvenih inovacijah, pri čemer lahko opazovanje razdelimo na tri sklope, ki bodo pojasnjeni v nadaljevanju, in sicer najprej bom opisal *problem in opredelil raziskavo*, nato bom pojasnil *raziskovalno metodologijo* ter predstavil *rezultate praktičnega in teoretičnega prispevka*, na koncu pa bom predlagal možnosti *nadaljnjega raziskovanja*.

Problem in opredelitev raziskovalnega področja

Vse prisotna razpoložljivost informacijske in komunikacijske tehnologije (IKT) na splošno in še posebej DM vplivajo na način inoviranja v dobi (sodobnih ekonomij) storitvenih inovacij. DM so zelo interaktivne platforme, ki posameznikom in skupnostim omogočajo, da delijo, soustvarjajo, razpravljajo in spreminjajo ter ustvarjajo

[54] Uporabljeni slovenski izrazi so razvidni v slovarju (priloga I).

t. i. uporabniško-vsebino (Kaplan & Haenlein, 2010). Kot primer lahko navedemo mikro bloge (Twitter), poslovno mreženje (LinkedIn) in socialna omrežja (Facebook).

DM so nove tehnologije, ki ustvarjajo "razdaljo med družbo in njenimi strankami; torej, interakcija med strankami in zaposlenimi pogojuje tehnologija" (Edvardsson, Gustafsson, Kristensson, & Witell, 2011, str. 303). DM tako otežujejo zaposlenim razumevanje stranke in vplivajo na njihovo interakcijo, zlasti na možnost pojasniti z DM, kaj eden in drugi potrebujeta oziroma želita. Hkrati pa DM omogočajo podjetjem interakcijo z ljudmi, povezanimi v različnih skupinah. Taki ljudje »so bolj seznanjeni z alternativnimi načini razmišljanja in obnašanja, kar jim daje več možnosti za izbiro in sintezo« (Burt, 2004, str. 349-350). To pomeni, da imajo DM lahko pozitiven vpliv na inovativnost v podjetju zaradi posredovanja informacij, ustvarjalnosti in socialne strukture. Kakorkoli DM drastično izboljšajo interakcijo, kar je izziv in priložnost za podjetja, ki želijo prepoznati in uporabiti znanja zbrana s pomočjo te tehnologije.

Pojmi DM interakcij so bili nakazani že leta 1968, ko je Doug Egelbart prikazal vrednost računalniških interakcij za pisarno.[55] Danes je take interakcije mogoče opaziti tudi pri razvoju inovacij na področju storitev z DM. To je svet storitvenih inovacij z uporabnikom DM. Zaradi novih IKT poti, kot so DM, se uporabniki štejejo za spodbujevalce inovacij. Ideje množičnega zbiranja virov (Howe, 2006),[56] kognitivnega presežka (Shirky, 2010)[57] in moč človeškega sodelovanja (Benkler, 2011),[58] in sicer kot socialne ali netržne interakcije v proizvodnji informacij ter znanja (Benkler, 2006), so motivirale podjetja v bolj učinkovito interakcijo z uporabnikom DM po vsem svetu.

Vendar sodobna ekonomija storitev in inovacij trpi zaradi dveh večjih vrzeli (Djellal & Gallouj, 2010). »Inovacijska vrzel« razkriva, da so storitvene inovacije predmet razvoja znanja, ki ni nujno merjen s tipičnimi inovacijskimi kazalci, kot so na primer R&R in patenti. »Vrzel uspešnosti« kaže, da zahtevajo proizvodnja storitev, storitvene inovacije

[55] Prikazane so različne oblike interakcij med človekom in računalnikom (e.g. miška, hypertext, računalnik v omrežju, in predhodnik grafično-uporabniškega vmesnika).
[56] Pridobitev idej, storitev, vsebine, itd. z veliko skupino ljudi, ponavadi s spletno skupnostjo, ne z delojemalcem /dobaviteljem.
[57] Zaradi ogromne povezanosti ljudi po svetu je mogoče deliti, ustvarjati in sodelovati na različne načine. To omogoča pridobivanje informacij, ki so bile prej nedosegljive.
[58] Razpoložljivost ogromne interaktivnosti s pomočjo človekovega sodelovanja v DM spreminja podjetja, vlade in družbo na splošno. Zaradi nizkih stroškov sodelovanja obstaja manj omejitev pri tem, kaj je mogoče doseči s človeškim sodelovanjem.

in vrednotenje njihove uspešnosti ne le kazalce za merjenje uspešnosti, ki se tipično uporabljajo, kot na primer produktivnost in rast, temveč t. i. večmerilnost. Namen te disertacije je preučevanje dinamične interakcije med uporabnikom DM in organizacijo v storitveni inovaciji. Predlagam, da ta vrsta storitvenih inovacij zmanjšuje vrzel inovacij in uspešnosti v storitvah na splošno in poudarjam, da moramo meriti tudi aktivnosti uporabnikov DM na področju inovacij.

Argument te teze je, da so DM eden od gradnikov (virtualnega) gospodarstva zaradi interakcijskih storitvenih inovacij z uporabnikom. DM povezujejo ljudi zaradi njihovih želja, namesto s tehnološkim "seznamom določenih podatkov". V tem primeru je tehnologija integrirana iz lokalnega konteksta. Ni treba posebej poudariti, da se najhitreje rastoča podjetja osredotočajo na odnos s stranko. Stranka je v središču proizvodnje vrednosti oziroma ustvarjanja, ki se širi z digitalizacijo postopkov, ki avtomatizira, vključije in usklajuje dejavnosti uporabnikov in povečuje prihodke storitev, različnih dejavnosti in aktivnosti, usmerjenih na stranko (Woerner et al., 2012). V zadnjem času je mogoče opaziti, da te dejavnosti pripomorejo h gospodarski rasti države (Banfi, Florjana, & Eric, 2014; Manyika, Lund, Robinson, Valentino, in Dobbs , 2015).

Metoda raziskovanja

Raziskava v tej disertaciji je bila osredotočena na podjetja, njihove storitve in inovacije z uporabniki DM. Povedano drugače, raziskava je bila osredotočena na konfiguracijo interakcije med različnimi sredstvi, vključno z ljudmi, informacijami in tehnologijo. V temelju je bila upoštevana vrednost v uporabi (integracija in uporaba virov v določenem kontekstu), namesto vrednosti pri menjavi sredstev (trdno vgrajene v t. i. ouput podjetja, ki je definiran s ceno).

Uporabil sem integracijo raziskovalnih metod na način, da je kvalitativna metoda vodila v kvantitativno (sekvenčna raziskava). Za integracijo smo se odločili iz dveh razlogov. Prvič, DM so nedavno, aktiven in »hitro spreminjajoč« se pojav, ki je zapleten in ima skopo število dokazov o storitvenih inovacijah (Aral, Dellarocas, & Godes, 2013; Kaplan & Haenlein, 2010). Primeroma lahko navedemo, da so bile v času raziskave spremenljivke storitvenih inovacij z DM neznane in da ni bilo mogoče uporabiti oziroma najti konceptualnega okvirja/teorije, po katerem bi se lahko orientirali. Drugič, študije storitvenih inovacij praviloma uporabljajo sekvenčno raziskavo, kar zaradi

posebnosti storitev (glej poglavje 2) ni presenetljivo. V njih je tako najprej opravljena kvalitativna faza, ki ji v naslednjem koraku sledi kvantitativna faza z zbiranjem podatkov za empirično testiranje instrumenta na podlagi analize z bolj strogim testom. Na ta način je mogoče z večjo zanesljivostjo ugotoviti, ali se lahko instrument uporabi na večjem vzorcu.

Navkljub uporabi integracije raziskovalnih metod, kot najbolj obravnavanemu tipu v literaturi, je bil glavni poudarek raziskave na raziskovalnih vprašanjih. Pregled literature razkriva, da študije storitvenih inovacij z DM bolj ali manj ne obstajajo. Zato je bilo treba zgraditi sistem za interakcijske inovacije na področju storitev z DM. Z njegovo pomočjo je bil razvit instrument za nadaljnjo empirično analizo. To je bilo podprto s tipičnim načinom mešanja kvalitativne in kvantitativne raziskave (Bryman, 2006; Greene, Caracelli, in Graham, 1989).

Kot rečeno je empirična potrditev hipotez temeljila na časovno zaporednih korakih. Najprej je bilo opravljeno kvalitativno zbiranje in analiza pridobljenih podatkov. Na podlagi raziskovalnih rezultatov je bila opravljena druga, kvantitativna študija in testiranje začetne ugotovitve (instrument). Zato je bil ustvarjen statistični model, ki je omogočil posploševanje končnih rezultatov na večjem vzorcu. Sledila je razlaga, kako kvantitativni rezultati temeljijo na prvotnih, kvalitativnih rezultatih. V kvalitativno študijo je bilo vključenih več različnih tipov metod, kar je omogočilo empirično raziskati koncept interakcijskih storitvenih inovacij z DM. Na tej podlagi so bile identificirane kategorije/spremenljivke, ki so bile obravnavane in uporabljene za postavitev različnih hipotez. Te hipoteze so bile nato testirane na večjem vzorcu podatkov.

Glede na raziskovalno področje je bil tak pristop raziskovanja nepogrešljiv, saj je raziskovanju primanjkovalo meritev/instrumentov, ki bi jih lahko takoj uporabili. Zato se je raziskava začela kvalitativno, saj je tak pristop najbolj primeren za take težave. Poleg tega je problem interakcijskih storitvenih inovacij z DM bolj usmerjen kvalitativno; pomembni konstrukti so v času raziskovanja bili neznani in ustrezni instrumenti niso bili na voljo; raven virov je bila omejena in je zahtevala oblikovanje le z eno vrsto podatkov; opredeljena so bila nova raziskovalna vprašanja, ki so temeljila na kvalitativnih rezultatih, na katera ni bilo mogoče odgovoriti z razpoložljivimi podatki (od drugod). Koristno je, da se najprej obranava dizajn in nato testira instrument,

prepozna pomembne spremenljivke za študijo na večjem vzorcu in potem posplošuje kvalitativne rezultate na različnih skupinah v primeru, da ena skupina ni na voljo (npr. VLP Clark & Creswell, 2011).

Teoretični prispevki

DM delujejo v sodobnih ekonomijah, kjer prevladujejo storitvene inovacije, ki so izzvane z vrzeljo v uspešnosti in inovacijah. V drugem poglavju smo opazovali več različnih teoretičnih perspektiv, s katerimi se obe vrzeli zmanjšujeta s tehnološkimi in netehnološkimi inovacijami. V zadnjem času se kombinacija oziroma sinteza obeh vse bolj uveljavlja. Taka sinteza temelji na izkušnji vrednosti v uporabi. Točno taka večrazsežnost vključuje uporabnikove inovacije, ki razkrivajo različne poti in dinamiko inovacij na področju storitev. V nadaljevanju so povzeti štirje teoretični prispevki disertacije.

Glede na večrazsežnost storitvenih inovacij in DM smo najprej povzeli sintezo uporabnikovih storitvenih inovacij, ki temeljijo na tehnoloških in netehnoloških posebnostih. *To je prvi teoretični prispevek*. Glede na to je mogoče ugotoviti, kako integracija DM hipotetično razkriva utelešene posebnosti znanja, ki vplivajo na vrzeli uspešnosti in inovacij. Kopičenje znanja se lahko preučuje tudi z družbeno-medijskimi kazalniki, ki temeljijo na uporabniških inovacijah, pri katerih lahko opazujemo znanje iz različnih kontekstov in trajnih učnih procesov v smislu tehnoloških, socialnih in ekonomskih interakcij.

Integracija DM in storitvenih inovacij z uporabnikom je izvedljiva s konceptom uporabniško-storitvene inovacije (UBSI). Na ta način so identificirane in uporabljene posebnosti tehnoloških in netehnoloških inovacij. Glede na to podpremo hipotezo o interakcijskih inovacijah v storitveni ekonomiji, kot jo predlagajo drugi raziskovalci. Tako s konceptom UBSI zmanjšamo vrzeli uspešnosti in inovacij v storitveni ekonomiji z DM. To je mogoče doseči s sistemom in različnimi elementi vrednosti komunikacije, trga in dinamike storitveno-inovacijskih mrež v različnih sektorjih. *To je drugi teoretični prispevek*. Zaradi lastnosti takega sistema lahko razumemo posebnosti DM, še posebej v zvezi s storitvenimi inovacijami, in prepoznamo vrzel med interakcijami v DM in interakcijami v storitveno inovacijskih omrežjih v različnih sektorjih.

Vrzel smo zmanjšali z interakcijskimi storitvenimi inovacijami z uporabnikom DM; za ta namem smo naredili model. *To je tretji teoretični prispevek*. Funkcije modela so posledica integriranih teorij oz. kombinacija induktivnega in induktivnega raziskovanja (angl. abduction). Najprej smo opredelili funkcijo za ustvarjanje DM inovacij. Potem smo opredelili funkcijo, kako braniti strukturo procesne inovacije z uničevanjem določenih DM inovacij, saj te niso vsleje koristne za organizacijo. Vendar smo t. i. ustvarjanje in uničevanje DM inovacij uskladili s funkcijo za vzdržno inoviranje storitev z DM v procesu soproizvodnje in/ali soustvarjanja vrednosti.

Rezultati so pokazali, da se DM uporabljajo v kombinaciji različnih strategij. Podatki, ki so zbrani z DM, so lahko strukturirani v inovacijskem procesu. Zato si organizacije prizadevajo za inoviranje tudi z uporabniki DM. Vendar pa organizacije ne razumejo vedno inovacij DM zaradi pomanjkanja določenih (organizacijskih) zmogljivosti. Zato lahko z destrukcijo določenih informacij poskušajo ohraniti DM inovacije oz. vzdržno inovirati z DM. Za interakcijske storitvene inovacije z uporabnikom DM smo uporabili različne teorije in rezultati kvantitativne raziskave kažejo pomembno podporo za zagovor interakcijskih inovacij na področju storitev z uporabniki DM. *To je četrti teoretični prispevek*.

Praktični prispevki

Praktični prispevki raziskave se kažejo kot doprinos, prednosti, praktična uporabnost in vodstvene posledice. Glavni doprinos raziskave je njena izvirnost. Čeprav se število raziskav na področju DM povečuje, v času raziskovanja ni bilo mogoče najti raziskav o storitvenih inovacijah z vidika DM. Teoretiki so sicer predlagali številne izzive na področju storitvenih inovacij, vključno z interaktivnostjo z uporabnikom, vendar pa šele ta raziskava uporabniških interakcij upošteva DM. Zato je v tej disertaciji udeležba uporabnika (DM) neizogibna; izhaja iz sistematičnega vidika modela interakcijskih inovacij na področju storitev z uporabnikom DM.

Prednost te raziskave ni le ugotovitev interakcijskih možnosti inovacij na področju storitev z DM, temveč tudi konceptualizacija sistematičnega okvirja, v katerem je mogoče uporabiti tudi druge interakcijske modele. V tem okvirju je zaradi vseprisotnosti uporabnika DM lahko tudi človeški um vzvod. Gibljemo se torej onkraj tehnoloških inovacij, kot na primer “tipična” obdelava podatkov decentraliziranih omrežij digitalne ekonomije (npr. Internet). Okvir nam tako omogoči, da zajamemo

integracijo odnosov in srečanj v različnih kontekstih med ljudmi, ki ustvarjajo enostavne in kompleksne storitvene inovacije z DM v različnih sektorjih. V času raziskave primerljivega okvirja, ki bi se nanašal na DM, ni bilo mogoče najti.

Praktična uporabnost je razvidna iz predlaganega prihodnjega raziskovalnega programa in uporabe DM v moderni ekonomiji storitvenih inovacij. Za gospodarstvo najprej predlagamo, da podjetja uporabijo koncept UBSI za interakcijske storitvene inovacije z DM v različnih sektorjih. Obstaja več načinov kako je mogoče uporabiti koncept UBSI v praksi. Dober primer je, da se uporabi posebna moč koncepta UBSI in se osredotoči na njegovo uporabnost. Če namreč želi funkcionalna ekonomija skrbno upravljati s proizvodi, lahko uporabi uporabnika DM za interakcijo s proizvodom. Uporabnik DM bi tako imel vzpostavljeno interakcijo s proizvodom, pri čemer bi posamični proizvod prikazoval določene posebnosti, ki so pomembne v ekonomiji na splošno (doseženo tudi z uporabniško izkušnjo in soustvarjanjem). Na ta način bi lahko podjetja opozovala vsak proizvod posebej, upoštevaje njegov kontekst in določene posebnosti, katerih trend lahko definirajo uporabniki DM. Na podlagi tega bi bilo mogoče hitro predvideti različne interakcije med proizvodi in upravljati odnose na interakcijskih storitvenih inovacij z uporabnikom DM v/za posebne okoliščine.

Program raziskovanja bi lahko obsegal nadaljnje preučevanje sistematičnega okvirja z vidika različnih vlog uporabnikov in njihovih kontekstov v storitvenih inovacijah. Razviti bi bilo mogoče različne raziskovalne smeri. Prvič, naš sistem bi lahko uporabili za različne interakcijske storitvene inovacije v različnih kontekstih z uporabnikom DM in tako razkrili različne vloge in nove metode soustvarjanja. Drugič, interakcijski model bi lahko uporabili in razjasnili dinamiko ter usmeritve storitvenih inovacij v posebnem odnosu soustvarjanja oziroma soproizvodnje. Tretjič, program raziskovanja bi se lahko bolj osredotočil na kvantitativne raziskave. Tako bi lahko na primer spremenljivke iz različnih kontekstov vključili v merjenje storitvenih inovacij z DM in opazovali pomembnosti med njimi.

DM omogočajo več moči manjšim, bolj nišnim delom organizacij po vsem svetu na splošno, zato imajo posledice tudi za management. To razkriva različne kontekste in interakcije z integracijo utelešenega znanja. Danes imajo uporabniki možnost vplivati na kulturo, ne glede na velikost organizacije – sposobnost ustvariti trend in biti viden. Ob tem različne organizacije še naprej ustvarjajo priložnosti za sodelovanje in si

prizadevajo dati ljudem boljše možnosti, da so slišani in da širijo svoj glas. Moč DM je prav v tem, da omogočijo glas ljudem, ki ga prej niso mogli imeti.

Kot smo raziskovali v tej disertaciji, lahko organizacije izkoristijo to moč z aktivnimi interakcijami z DM. Tako lahko ponudijo storitev, product, proizvod, sistem vrednostnih izkušenj itd. z interakcijami tudi z DM. Podjetja lahko opredelijo svoj produkt kot "socialni medij," vmesno snov, ki omogoča njihovim strankam, da se vključijo kot uporabniki in da so v interakciji med fizičnimi in virtualnimi okolji. V nekaterih študijah primerov v tej disertaciji smo opazili, kako podjetja uporabljajo funkcije DM, kot so "deliti" ali "všečkati," ne le za slike svojih produktov, temveč tudi za značilnosti teh produktov. Vendar bi lahko navedene funkcije povezali in razvili v izkušnje ter tako oblikovali t. i. transformacije, ki so težje predmet "komoditizacije" (angl. commoditization). V prihodnosti lahko pričakujemo, da bodo nastali različni konteksti zaradi nevidnih interakcij tudi z DM.

Čeprav smo vselej imeli možnost, da se odločimo o sprejetju tehnologije, danes podjetja ne morejo ignorirati tehnologije DM, ker bi se s tem odpovedali integraciji interakcij v inovacijah, ki danes pomenijo že več kot 70 % delovnih mest in dodane vrednosti, medtem ko povpraševanje po storitvah pomeni 50 % celotnega končnega povpraševanja. Vendar pa obstajajo tudi druge nevidne interakcije, ki pomenijo izziv za napredne ekonomije po vsem svetu zaradi moči interaktivnosti. Predpostavka te disertacije je, da se bodo takšne interakcije še bolj razpršile v storitvenih inovacijskih mrežah v različnih sektorjih (z DM). Zato imajo podjetja priložnost ne samo, da zajamejo še nevidene interakcije z DM, temveč da jih tudi izkoristijo in si poleg soproizvodnje prizadevajo tudi za soustvarjanje vrednosti z uporabnikom svojih storitev, proizvodov ali blaga za svojo konkurenčno prednost. Takšno sodelovanje bo v prihodnosti nujno za storitvene inovacije z uporabnikom DM.

Nadaljnje raziskovanje

Identifikacija različnih pomanjkljivosti raziskav storitvenih inovacij z DM odstira več možnosti za nadaljnje raziskovanje. Čeprav je metodologija, uporabljena v tej disertaciji, primerna za preučevanje pojavov DM, je treba opraviti več kvantitativnih študij. Tako smo v prvem koraku naše metodologije identificirali določene organizacijske posebnosti, ki niso bile kvantitativno ovrednotene na večjem vzorcu. Druga pomanjkljivost je napredek določenih DM posebnosti v organizaciji, ki bi jih bilo

mogoče obravnavati v razmerju do soustvarjanja (pomembno pri izpeljavi izkušnje z uporabniki). Tako na primer DM omogočajo ogromne interakcije, ki jih lahko podjetja uporabljajo na splošno in ki bi jih lahko raziskovali z vidika posebnih kontekstov.

Čeprav je v našem sistemu konceptu UBSI dana prednost, bi bilo treba ta koncept še bolj vključiti, še posebej z vidika zmožnosti uporabnikov v različnih kontekstih. Glede izkušenj je to velika pomanjkljivost raziskave, ki vodi do omejitev pri uporabniškem soustvarjanju. Tako smo na primer obravnavali storitvene inovacije z uporabnikom DM, vendar morebitnih vprašanj, ki se lahko pojavijo v takšnih interakcijah, nismo raziskali. Interakcije z uporabnikom pri storitvenih inovacijah pomenijo resne težave pri ocenjevanju stroškov in odobritvi sredstev. Ta vprašanja in težave so ključnega pomena v odnosu med podjetjem in uporabnikom, zlasti v zvezi z inovacijami. Zato gre tudi v tem primeru za še eno vrzel, ki bi jo bilo treba raziskati.

Velika pomanjkljivost raziskave je varstvo zasebnosti pri interakcijah v razvijajočih se digitalnih ekonomijah na splošno. Ta disertacija se namreč ne ukvarja z nobenim od vprašanj varstva zasebnosti. Sistem, ki izhaja iz te raziskave, bi lahko imel težave pri vključitvi interakcijskih storitvenih inovacij z uporabnikom DM brez ustrezne integracije tega perečega problema v proces storitvenih inovacij in vključitve uporabnika DM. Ena od glavnih pomanjkljivosti glede organizacije je, da nekatere slabosti DM (npr. lažne identitete) lahko omajala temelje kontekste raziskave.

Raziskava predvsem poudarja oziroma izpostavlja storitvene posebnosti interaktivnosti in nedotakljivosti z DM. Čeprav smo opredelili interakcijski model, ki zožuje vrzel v storitvenih inovacijskih omrežjih v različnih sektorjih, manjka pojasnilo, kako ta model pojasnjuje različne inovacije v različnih razmerjih z uporabnikom DM. To bi zahtevalo raziskavo različnih dinamik in trajektorij. Različni tipi inovacij imajo namreč lahko različne sunke v inovacijah, ki temeljijo na informacijah in znanju. Takšni dinamike in trajektorije v interakcijskih storitvenih inovacijah z uporabnikom DM bi pojasnili, kako naj organizacije pričnejo in nadaljujejo z inoviranjem z DM. Trenutno je obstoječa raziskava glede tega omejena.

Kljub temu, da smo koncipirali pojem družbenomedijskih interakcij na sistemski ravni, smo raziskali le eno izmed potencialnih konfiguraciji sistema. Prihodnje raziskave bi morale preučiti več konfiguracij. Tako lahko na primer z našim sistemom uporabimo neskončno regresijo različnih kontekstov z DM kot vzvod. Posledično bi bilo mogoče

opredeliti in raziskati druge interakcije storitvenih inovacij (tudi z DM). Poleg tega koncept UBSI omogoča pristop, ki temelji na lastnostih, z nekaterimi posledicami. Razumevanje kompleksnosti DM interakcij je lahko zahtevno, saj je tak pristop do storitvenih inovacij odvisen od teorije, ki ne sme slediti kompleksnosti DM. Ni treba posebej poudariti, da naj bi se prihodnje raziskave morale osredotočiti na pomen teh posledic s kompleksnostjo DM v mislih.

Pojav nevidnih interakcij v digitalni ekonomiji ne veča le uspešnosti, temveč tudi inovacijsko vrzel v storitvah. Uporabniški kazalniki, ki temeljijo na DM interakcijah do neke mere preprečujejo inovacijske vrzeli v digitalni ekonomiji. Čeprav smo opredelili možne kazalnike za zmanjšanje inovacijske vrzeli z DM, bi morale prihodnje raziskave preučiti vplive oziroma posledice DM na uspešnost; z iskanjem "nevidnih" interakcij bi bilo mogoče razviti kazalnike DM s potencialom za zmanjševanje vrzeli uspešnosti glede storitvenih inovacij z uporabnikom DM.

Appendix I: Dictionary of English Slovenian terms / Slovar slovensko angleških izrazov

Co-creation – soustvarjanje

Commoditization – komoditizacija

Competitive advantage – konkurenčna prednost

Co-production – soproizvodnja

Digital economy – digitalno gospodarstvo.

Embodied, personified knowledge – utelešeno znanje

Experience – izkušnja

Functional economy – funkcionalno gospodarstvo/ekonomija

Interactional service innovation with the social media users – interakcijske storitvene invacije z uporabnikom družbenih medijev

Invisible innovation – nevidne inovacije

Invisible interactions – nevidne interakcije

Interaction – interakcija

Interactional innovation – interakcijska inovacija

Product, good – produkt, proizvod (glede na konteks)

Relationship – razmerje

Service innovation – storitvene inovacije

Service innovation networks – storitveno-inovacijska omrežja

Social media – družbeni mediji

Synthesis or integration – sinteza ali integracija

Technological innovation – tehnološka inovacija

Untehnological innovation – netehnološka inovacija

User-based innovation – uporabniške inovacije

User-based service innovation – uporabniško-storitvene inovacije

Value – vrednost

Value experience – vrednostna izkušnja

Transformation – transformacija

Appendix J: Selection of interviews (exploratory study)[59]

Question	*Company*				
	1	*2*	*3*	*4*	*5*
Theme 1: The general importance of social media					
How much time do you (and your colleagues) devote to communicating or following users at social media?	A lot. Strong community engagement. Get Satisfaction, open service forum, UStream ... Phone, email (office hours!)… (CEO)	Communication with end-users mostly considered for the support of the group.[60] Answering questions, figuring out what bothers users... We do user-experience testing, interview – one to one interviews. We relatively separate social media from gathering quality or quantity feedback from users. Social media is for support, distribution (cf. marketing). Real insight happens when we talk to users one-to-one. However, we also use social media to recruit interesting users. (CTO, CEO)	"One person 4 days a week." All our characters have Facebook pages and we communicate with our users there. But, in China users are elsewhere. Our apps have built in video recording that allows to record and share the video on Facebook or YouTube, or other (famous) social web sites in a particular country. (CTO)	"Half of the employee per day to communicate with our customers and consumers." … 3 people: - head of digital – direction and communication control - head of brand … – covers younger generation (sector) of the bank, covering of communication also on Facebook - student – helping with daily activities, such as organization. (CMO)	I ... spent 30 min per day or even less on social media, ok, if we count LinkedIn 30min to 1h on social media, that's for me... However, I would say that people are usually spending more time on social media per day, couple of hours... which is apparently personal stuff, this is not necessarily related to the work in anyway. The time I spent is typically related to work, its LinkedIn … as an important recruiting tool, so (CTO, CEO).
Which types of social media do you use?	Twitter, Facebook, Pininterst, own blog… [Recently company engaged the] social media strategist [who] is looking into new ways of communicating with social media.[61](CM)	Blogs, Twitter (public), Facebook (private) Twitter is much better for support than Facebook… (CTO)	Facebook, starting with Twitter, which will be important for one character only, for now. Facebook-provides powerful social graph – enables sharing the video for us. "Line and fun of our page too." Twitter-more two way communication, and also support. People ask questions on Twitter that would not on Facebook. (CTO)	Facebook only. The first is for younger generation with 20k followers. Opened 2 and 1⁄2 years ago. Just opened the second profile, already gained 600 followers. Leading in terms of Facebook [in Slovenia]. No Twitter for the moment, we are waiting… [Distinction between Facebook and Twitter is made] in terms of required time to respond. (CMO)	... obviously Twitter and Facebook have kind of a more general presence ... obviously LinedIn is more professional... SlideShare e.g. is more content based, etc. However, [we are] present across "all" social media types. (CTO)

[59] The first open-ended interviews. More interviews available upon request.
[60] Cf. the 4C interview (question 4.2).

[61] Cf. the COMM interview.

Theme 2: The importance of information on social media					
What types of information do you usually get?	… announcement, updates for new product launches, new community phase of the project… to let people know when to start participating, also weekly live events, brainstorm meetings, evaluation meetings… (CM)	When something is not working, when users do not understand how something works – misunderstanding about the product. Responding to a bug fix, or that user is informed about the expectations around the tool… (CTO)	Little bit of a support (apps and merchandize toys) General questions about characters, trying to communicate with the character itself. No systematization – we have complex biographies written about our characters, so we know who they are. If we know the answer than we answer it, otherwise we kind of avoid it. (CTO)	All types of information. Anything we need, we asked them. [Audience] helps us developing products and services. Example: Young generation requested GEO location of the ATMs on a "mobile bank" app. This was achieved via social media, because we had a chance to do that – measuring customer insight. We wanted to improve our service for a current price. (CTO)	… general social media is a channel which companies as our use more to have a presence and less so to get the feedback from customer or clients and so on. Especially given that we are B2B company so we do not have kind of "direct consumers"... we cannot really do any data mining or getting any feedback from consumers trough social media... At least it is not helpful for us at the moment. LinkedIn is much more helpful. It is very helpful for recruiting, very helpful to understand the companies and people within our industry for understanding the relations between them, understanding how the whole industry from peoples' perspective functions, so, that is very helpful tool for us. (CEO)
Do you learn about things that you otherwise do not learn about?	Its more about posting and not cleaning information.[62] Some feedback trough social media, mostly via web site Get satisfaction ... Social media is used to update and connect with the community members… (CEO)	Twitter and stuff is useful for generating ideas – especially what is the outcome - testing of the ideas. Here we are surprised all the time, but [it really] happens on real idea validation. (CMO)	Yes – some people become obsessed with some characters, brand - the amount of the attachment. Facebook (likes, individual posts = engagement per month) we use for promoting our apps, promote the toys, and most important to create the interesting content for the fans – mini stories (how characters go to [e.g. a country]-office production) that appear only on Facebook – simple content creation and definitely virtual story production. Feedback from users is mostly support. We tried with ideas, but that didn't turn out to be smart. People do not know what they want. … We do not pay much attention to what people say on social media, except about support issues – no ideas! The culture case is about the humour, here we did not pay much attention, since users were sharing it more – driving the engagement. (CTO)	In the past we needed to organize focused groups, interviews... research methods, etc. Now, with social media, this is here for free. Users are willing to share with and for us. It is much easier. Daily … we can check things that we are interested immediately, their feedback is prompt. If the problem is too complicated we move to 1-to-1 direct communication. Sometimes people approach us with personal problems via Facebook and, if it is too complicated we propose email/personal communication. Examples: - confirmation of rock band popularity, - we provided refreshments (relationship management) due to receiving info via Facebook about the next door-cuing for public transportation ticket beside being nice, got confirmation, provided point of sale material... where we have advanced our marketing material for the next campaign, because we were able to work with the target group a bit earlier… (CMO)	Its pure information, … LinkedIn gives you very good information on overview of the companies and people in the industry. But, in terms of finding special information, I would say, social media to certain extent would just underline the things you already know, so, kind of enhance the behaviour you are already aware of. To certain extent it would obscure certain things that you would otherwise observe. If you know how those social filters work or how people apply them, it gives you some information, as I said LinkedIn, but any special learning for us, as a B2B company, it does not offer much of that. So, for us it's a more of a communication than a learning tool. (CTO)

[62] Cf. the COMM interview (question 1).

Theme 3 : The processing of social media information within organization					
How do you process this type of information into your company?	The form of communication is to allow users to see what [a company] is currently doing. Its also a way of potentially cleaning new members, if somebody see that my friend is following [the company] on Facebook, Twitter I may be interested in seeing what this is about – useful in that way… (CM)	Information is shared around the company... Therefore, the interested can follow, however, it's decided individually with what to proceed. People are responsible to listening, however, available to everybody. This is not busy in terms of NPD (New Product Development). Usually, we are able to resolve the matter by the first questions due to the past tries. However, if the situation is more interesting we would organize 1-to-1 interview, then we would tested it (build, measure and learn something from it). (CTO)	Majority of information comes from observing people – not from looking what they tell you, but what they actually do. User tests – we give a child an app then we observe what she does – engages. We record videos. We do a couple of tests. This is where Facebook cannot be useful, because if you ask questions or listen to the people and their comments you do not actually get to the point. 1) statistics and 2) how the app is used. (3) see live some things that we cannot see in user tests [where?] Social media is not much used in NPD. Works like added information at the end, when we see what people like about our characters. Its not the major channel for distribution either. This happens when we cross promote trough our own apps [exploiting user base] When launching our first app, we even did not have social media and the app got big due to viral effect, social effect, but not social media effect.(CTO)	No systematic approach. It depends on three people. If corporate issues we communicate instantly to corp. comm. Dept., if product issue... product manager, we try to give ASAP feedback to the consumers – 24h. Today [via social media] communication is less strict – less formal. (CMO)	We have a team of product analysts that translate information from product data to something that is understandable, to the product team, designers, to the engineers. They interpret that data so that it is understood by humans. But, we have a special team to do that. (CEO)
How do product development employees view this type of information (given that marketers collect it)?	This information is cleaned on the web site not via social media. The company has its own particular development/ innovation process that is about constant engagement with their community. Mechanisms of voting and pricing game. Product testing – prototyping. Alignment of manufacturing quotes. (CM)	In the product group we try to collect and discuss ideas or whatever works from anywhere and it could anybody. Once we have a champion of the idea. We seat [down], meet and see how can we fix, build it. If we get to the point of the implementation, then part of the team is to keep the balance between exploring new ideas and improving, fixing existing ideas. (CTO)	This information has little to do with the NPD - mostly brand building stories… however, it may be true that we "took" some ideas … We only see how our fans react to the stories – we see that, but not in the way where our products will go… (CTO)	Marketing and R&D can look at the information whenever they wish due to open account on Facebook. They play two roles in the Facebook society (employees and retail customers), so they have the feeling when and what to ask our community, being able to develop right staff for the right group. This is done from time to time by asking questions. It is less formal so people tell us more then in formal interviews. They are very relaxed and behaviour is different. We combine several research methods and sources of communication, also social media – there is no distinction. However, this is becoming more and more important, because this is one of the cheapest way of gaining ideas and consumer insights for the bank, especially lately due to the cost restrictions [on daily operations]. (CMO)	… we follow how users interact with our ads. We have two types. Our customer, designer and agencies, use our tools to build the ad and those ads would be then shown to the end-users. We follow both, how designers use our tools to build the ad and how end-user interact with those ads. Both inform how we develop products, because for us it is important that designer and agencies can instantaneously build those ads, so that they have the right features, do the right things, … build the ads. We want as well follow how the end-users interact, because we want to make sure that those ads that are built, offer great user experience. We can influence that in a way how we develop our tool and both streams of data informs us how we build the product… (CTO)

Theme 4: The processing of social media information outside the organization					
How do you interact with customers (does the company chat with them or just silently look what they post on social media)?	Customer (three different mediums) … email of the company, directly also call post on support web site Personal touch is emphasized. leaving a customer with a good feeling about the company – relationship. (CTO)	Both! We chat with the users that we used for the interview. We also passively chat. … the social media is the end of the funnel feedback. The real feedback happens inside the app where we have our own matrix and we can observe how users behave. It is more important how users behave than what they say about it. (CEO)	In majority by mail - 30 to 50 per day, a little bit also via social media, here we only answer questions, no chat. YouTube, we may re-post interesting videos that were recorded, but we do not really track - too much information out there. Community wise we have pages for some of the characters and usually for some fans we know they will react, because they are so engaged. This is a minority. (CTO)	We interact daily on hourly basis… (CTO)	Product team development... yes we are constantly in talks with our clients... this can be in person ... we do collect feedback in many different ways... we discuses with them and listen to their ideas... this is very much in person...however, at the same time we are following how they are using the product, we follow anonymously. This is aggregate data so we do not know for a particular person how it uses, because we do not want to violate privacy regulation, etc. (CEO)

Notes (informal communication with the CEOs mainly):

Company 1: … community members are not necessarily people that buy products. These are people who are member of the social media, majorly company's web site. Customer implies someone who buys the product therefore, the product is on the market, so it would not necessarily be something for the NPD. However, the company keeps a record, if somebody is complaining about the product that is already on the market, this information is also passed to the NPD team, if the product perhaps needs to be modified…"Can we alter the drive of some piece of content, figuring out what is the next thing, so that the algorithm figures it out what the next thing is, and trough all this how to keep the reader happy and engaged" [see answers to the question when exchanging the app for social media, on p.4 of the transcript no. 2] in the 4C Interview.

Company 2: … we do not put strong emphasis on community of users. We tried that, but we found that our products are used individually and this is how we further develop them. For instance, we tried user group meetings, but it did not work.

Company 3: … we have our "advertising" site for other types of user groups. Here we can cultivate kind of a user group of friends around that. Bloggers as a group are really diverse. We approach them individually… leading to a paradox between satisfying big and small blogger – different products for specific groups of users.…