A service view of "smart" ACAP: the IBM Watson case

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ABSTRACT

Smart technologies exert a direct influence on knowing and learning abilities by facilitating the transfer of knowledge (Iyengar, Sweeney, & Montealegre, 2015), reducing the efforts needed to identify, assimilate and use new knowledge internally (Carlo, Lyytinen, & Rose, 2012).

My research aims to analyse the impact of smart Technologies on knowledge-based skills, such as absorption capacity (ACAP) and how the evolution of "smart" ACAP affects value co-creation practices.

The study starts from a systematic literature review (SLR) as its methodology, in parallel with the empirical research, based on the artificial intelligence system called IBM Watson. The resulting empirical research based on IBM Watson highlighted the themes evolution of learning and knowing in service science. Consequently, the bibliometric method has been used to enhance the contribution of the SLR focused on learning, knowing, and service research, by an objective assessment of scientific literature, by increasing the rigor, and by alleviating researcher bias (Zupic, 2015).

The applied methodology elicited a series of first- and second-order categories, linked to the features of the ACAP and the related changes that IBM Watson enabled. A further level of abstraction allowed me to identify four themes associated with co-creation practices: (1) **D**ialoguing, (2) **U**nderstanding, (3) **C**reating, and (4) **E**nabling.

A Gennaro,

Mi hai spinto a fare di meglio
hai tirato fuori tutta la mia forza.
Inconsapevolmente, sin dai primi battiti del
tuo piccolissimo cuore,
hai supportato e accettato tutte le mie scelte
senza mai un capriccio,
mai una lacrima,
anche quando determinate scelte
hanno richiesto un sacrifico anche tuo.
.

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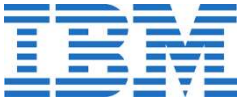


CONTENTS

Introduction

Although many disciplines have analyzed the topic of intelligent technologies defining their fundamental importance both for business scholars and professionals (Lemon and Verhoef, 2016), there appears to be a lack of comprehensive approaches that explain the phenomenon and its consequences form an ecosystemic perspective.

Nowadays, the complexity of relationships in business contexts has resulted in great attention to the large variety of ways in which actors interact with each other (e.g., Håkansson and Ford, 2002) and the outcomes of these interactions. The vision of relationships within the Service-Dominant Logic (S-D Logic) is based on the co-creation of value by the actors, rather than on the generation of the output of the G-D logic, in which it is assumed that value is added and incorporated in the production of the product. Value arises and develops over time, rather than as a distinct event linked to production and consumption (Vargo and Lusch, 2004; 2008). According to the S-D Logic, the relationship is not optional: the co-creation of value and the exchange of service require a network of co-value-creating relationships (e.g., Vargo et al., 2008). Even a single economic transaction between actors who implement a service orientation implies a relationship. According to Vargo and Akaka (2009) service is the basis for social and economic exchange, and it is different from single "services" and "products" that are seen as vehicles of service provision. It can be defined as "the application of specialized competences (operant resources – knowledge and skills) through deeds, processes, and performance for the benefit of another entity or the entity itself" (Vargo and Lusch, 2008). The integration of resources plays an important role. It represents a continuous process, which has been defined as "a series of activities carried out by an actor" (Payne et al., 2008: 86). The resource integration process aims to co-create value and create new resources potentially exchangeable with other actors (Lusch and Vargo, 2014) and is conceptually aligned with "service". In this perspective, the user of the service passes to the role of the integrator of resources (skills, knowledge, skills), this role is carried out in the various activities that can be

performed with the various actors of the service network. To analyze different aspects of value formation, including markets, organizations, consumption, symbolism, brands, and value co-creation management and business scholars used the practice theory (Akaka et al., 2014; Araujo, Kjellber & Spencer, 2008; Echeverri & Skålén, 2011; Schau, Muñiz, & Arnould, 2009).

S-D Logic postulates that the customer is always an active actor, which makes interaction and collaborative learning vital (Ballantyne and Varey 2006, Lusch et al. 2010), each actor uses their applied knowledge and skills to provide benefits to another party and themselves (Lusch and Vargo, 2014) and collective problem solving and novelty creation occurs in social interaction through activity change (see den Hertog 2002, Toivonen and Tuominen 2009).
The importance of knowledge and skills and the development of competencies is evident in many ways in the S-D Logic. Zahra and George (2002) defined the ability to value and acquire external knowledge as a potential absorptive capacity (potential ACAP) and leveraging absorbed knowledge as a realized absorptive capacity (realized ACAP). Despite the importance of the topic and the study of collaborative learning by various authors, such as Edvardsson et al. (2011), the bridge between S-D Logic and learning theories is still quite weak.

In the healthcare service ecosystem, patients are always more informed and owners of their healthcare journey and caregivers are more focused on value. Value co-creation in service innovation finds in smart technology one of the main enablers. Is interesting to understand what extent do smart technologies support knowledge-based skills, such as absorption capacity (ACAP) and how the "smart" Absorptive Capacity (ACAP) affects value co-creation practices.

To explore the value co-creation concept and address calls for research in this area, the study is organized as follows. The first chapter shows the systematic literature review and bibliometric analysis to outline the theory gaps and the research aim, and then describes the research process through which the research has addressed them, consisting of the paradigmatic position of the research and the methodology adopted, the choice of the research approach and the process of data collection and

data analysis. Then, the research context is presented. The second chapter first proposes a literature review of the value co-creation process and its main dimensions, running from the origins of the concepts and then analysing the concept from the Service-Dominant logic perspective. Second, the chapter analyses the concept of innovation by providing an overview of the state of the art of research about this topic. Chapter three offers a literature review on learning and knowing with a focus on ACAP. Second, the chapter analyses the role of smart technologies in service science.

The last chapter of the thesis (chapter four) illustrates the findings of this research and their discussion. The study finally discusses the main theoretical contributions and the managerial implications; then, limitations and suggestions for further research are outlined.

1 METHODOLOGY

The current study presents a Systematic Literature Review (SLR) of the research articles focused on service innovation and value co-creation. The resulting empirical research based on IBM Watson highlighted the themes evolution of learning and knowing in service science. The many themes addressed have made narrative literature reviews weak as the breadth of the research makes them likely biased and often lacking in rigor (Tranfield et al., 2003). Consequently, the bibliometric method has been used to enhance the contribution of the SLR focused on learning, knowing, and service research, by an objective assessment of scientific literature, by increasing the rigor, and by alleviating researcher bias (Zupic, 2015).

1.1 The starting point: SLR and Empirical Research

This study starts from a systematic literature review as its methodology, in parallel with the empirical research, based on the artificial intelligence system called IBM Watson (detailed in paragraph 1.6.4)

I selected the publications for the review in two steps. Step 1 is divided into three sub-steps. In sub-step 1.1 I scanned the Web of Science database. First, I looked for four keywords in the title, abstract or keywords (TS = Topic), namely, service innovation, value co-creation, practices and smart technologies OR artificial intelligence (AI)(1,618,440 articles).

In sub-step 1.2, I focused on the journals that were most likely to discuss AI in value co-creation and AI in service innovation, that is, articles published in top management, business, and service journals (SO = Publication name): Journal Of Business Research, Journal Of Management, Journal Of Service Management, Journal Of Knowledge Management, Journal of Product Innovation Management, Journal of Service Research, Knowledge Management Research Practice, Journal of Services Marketing, Service Industries Journal, Journal of Service Management (formerly International Journal of Service Industry Management), Journal of

Service Theory and Practice (formerly Managing Service Quality), and Service Science (altogether 30,017 articles). In sub-step 1.3, I combined a search of these four keywords in the title, abstract, or keywords, namely, service innovation, value co-creation, practices, and AI with the above-mentioned journals. The search resulted in 117 articles published in the top business, management, and service journals that featured the four keywords in the title, abstract, or keywords. The search extended across the whole period covered by the Web of Science until the end of July 2020.

In Step 2, the suitability of the articles for the review was assessed. It is divided into two sub-steps. In case the title and abstract did not reveal the content of the paper, the full paper was read to determine whether the article was appropriate for this study. I used two exclusion criteria. In sub-step 2.1, I excluded studies in which our search words were mentioned in the abstract or keywords, but the authors did not discuss them in the full text (Exclusion criterion 1). In sub-step 2.2, I excluded the studies that had employed AI in collecting or analysing data but did not discuss the usefulness of the AI-based method to co-create value or to innovate service (Exclusion criterion 2). Ultimately, I selected 58 articles for my final analysis.

Then I analysed the selected 58 articles. The analysis was composed of four phases: documenting, attaining basic understanding, coding, and categorization.

1) The details of the articles were documented using Microsoft Excel 2019 including the abstract, year of publication, and the journal name.
2) The selected articles were read to familiarize themselves with the research field and understand how the studies have developed over time and future research.
3) Whenever content related to AI in service innovation and value co-creation and was found, it was annotated and coded for its message or content. I used inductive content analysis, which is suitable for systematically interpreting the symbolic content of written communication (Helkkula, 2011; Kolbe & Burnett, 1991). Initially, there were nine codes: practising innovation, forecasting, prediction, all types of cognitive support, connecting actors, actors interaction, division of tasks, conceptual field

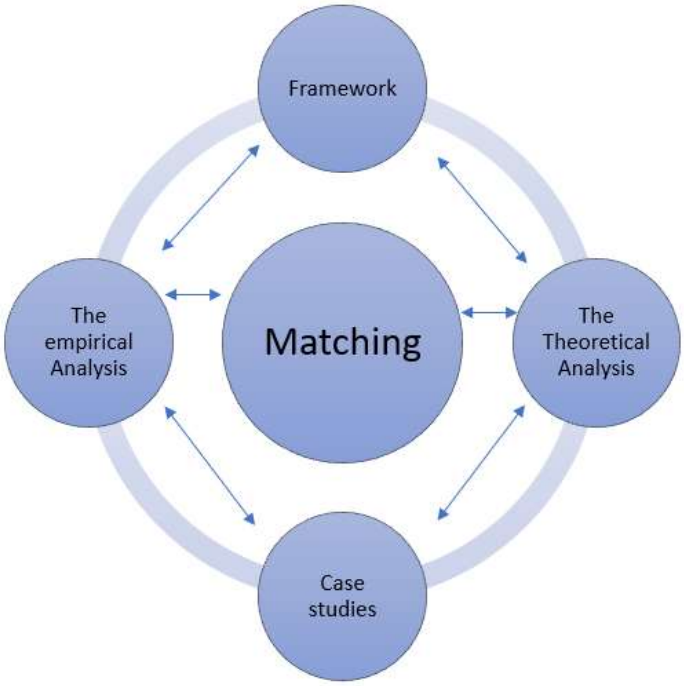
advancement, and supporting well-being.

4) I started inductive and interpretive thematic analysis (Braun & Clarke, 2006). It is suitable for a systematic review that aims at understanding a diverse research field (Jones, Coviello, & Tang, 2011). After, I categorized the codes based on the object of technological support. In other words, I reviewed whether AI was facilitating practising innovation.

The analysis of the literature was accompanied by empirical research at IBM (International Business Machines Corporation). Glaser (1978, p. 4) points to the importance of fit between theory and the reality and argues that data should not be forced to fit preconceived or preexistent categories, asserting rather that the categories are to be developed from data

In parallel, following an abductive approach, the research at IBM provided the case studies based on IBM Watson. As showed in Fig. 1-1, the case studies were considered unique means of developing the theory using in-depth insights into empirical phenomena and their contexts. A process of "systematic combining" allowed me to explain, develop, or modify the theoretical framework before, during, or after the research process.

Fig. 1-1: A process of "systematic combining"



The study of the cases shown in the paragraph (1.6.4) revealed the presence of a close link between learning, knowing, smart technologies, and service. Hence the need to move to the bibliometric study of the theory focused on these themes.

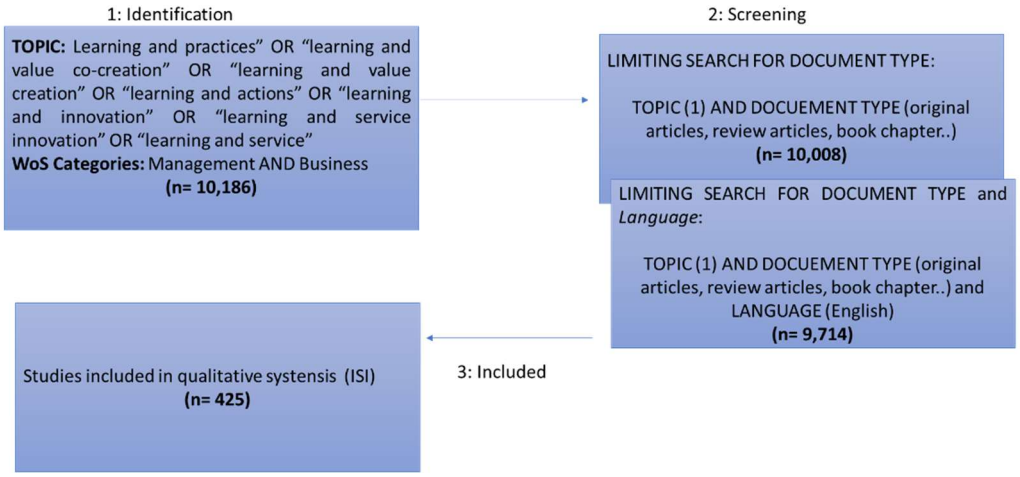
1.2 A systematic bibliometric analysis on Learning and Knowing: sample selection

To identify the articles focused on the theme under investigation, and identify the gaps in the literature, the study starts from a systematic review of literature in the fields of business and management. The review method is essentially based on the guidelines offered by Booth, Papaioannou, and Sutton (2012) and follow the method by Mustak, Jaakkola, Halinen, and Kaartemo (2016) with three consecutive stages: literature search, assessing the evidence base and analysing and synthesizing the findings.

Figure 1-2, shows the procedure for the selection of the articles analyzed. To carry out the study, it is performed a computerized bibliometric analysis from January 1993 to July 2020 for articles retrieved from the Web of Science (WoS) database, now maintained by Clarivate Analytics, one of the most important databases (Cobo et al. 2011; Sakata et al. 2013). To define the research domain, it is searched for scientific journal articles using the term “learning” and “knowing” and narrowing the investigation to management and business categories for the entire period for which databases provide online coverage. Searches focused on one main topic: learning, knowing, and service research. To identify all publications related to learning, knowing, and service research, it is included all synonymous all related topics, by including the Boolean separator "OR"/ “AND”: “Learning and practices” OR “learning and value co-creation” OR “learning and smart technologies” OR “learning and value creation” OR “learning and actions” OR “learning and innovation” OR “learning and service innovation” OR “Knowing and practices” OR “Knowing and value co-creation” OR “Knowing and value

creation" OR "Knowing and actions" OR "Knowing and innovation" OR "Knowing and smart technologies" OR "Knowing and service innovation". Information of retrieved articles was exported into Microsoft Excel 2013, and duplicates and non-pertinent journals and ISI categories were not included. In addition, all included articles were examined manually to identify articles that were not relevant to the quantitative analyses, because these were either not related to the main topic. The database, that is built, consists of 425 articles that have been published from 1993 (year of publication of the first paper on the topic) to 2020. Based on the reading of the abstracts of these articles, it is excluded those that did not fit with the topic of review. To eliminate on-pertinent journals and non-relevant articles, the systematic review included the following: original articles, review articles, book chapter, and proceedings papers only; articles in the English language only; articles in 7 different ISI categories of social science; articles reporting any aspect of learning; articles whose title included at least one of the above-mentioned terms. (Benavides-Velasco et al. 2013).

Fig. 1-2 Diagram of the process of identification and screening of the included articles



1.3 Data extraction

Pritchard (1969) defined bibliometric analysis as "the mathematical and statistical analysis of bibliographic records.". For studies that met the inclusion criteria, I extracted and analyzed the following relevant bibliometric indicators:

- main information about data (number of articles, source, keywords as assigned by the system and by the authors, average citations per article, number of authors, collaboration index)
- annual scientific production and citations
- top twenty productive authors, author's indices (h-index, m-index)
- dominance factor (defined as a ratio indicating the fraction of multi-authored articles in which a scholar appears as the first author)
- top twenty relevant sources with 2020 impact factor
- top twenty relevant keywords

All these indicators represent the foundation of the structure of knowledge.

This method is often used in literature reviews to unveil the underlying structure of a research field through objective analysis, thus avoiding the results to be biased by the researcher's perspective (Tranfield et al., 2003).

It is performed co-word analysis (CWA) (Callon et al. 1983). CWA is a popular method for technology analysis, encompasses (a) defining a set of keyword or key phrase patterns which are represented in technology-dependent terms, (b) generating a network that codifies the relations between occurrences of keywords or key phrases, and (c) identifying specific trends from the network (Yoon et al. 2011). It is one of the most widely used methods for quantitative and qualitative analysis. CWA generates a network using co-occurrences of keywords or key phrases related to learning and applies social network analysis (SNA) to identify trends from word co-occurrences (Lee and Jeong 2008; Callon et al. 1991).

1.3.1 Social network analysis (SNA) for bibliometric research

Originating from modern sociology, social network analysis (SNA) is designated to express the complex sets of relationships between members of social systems of all scales from interpersonal, inter-organizational to international relationships

(Wasserman and Faust 1994).

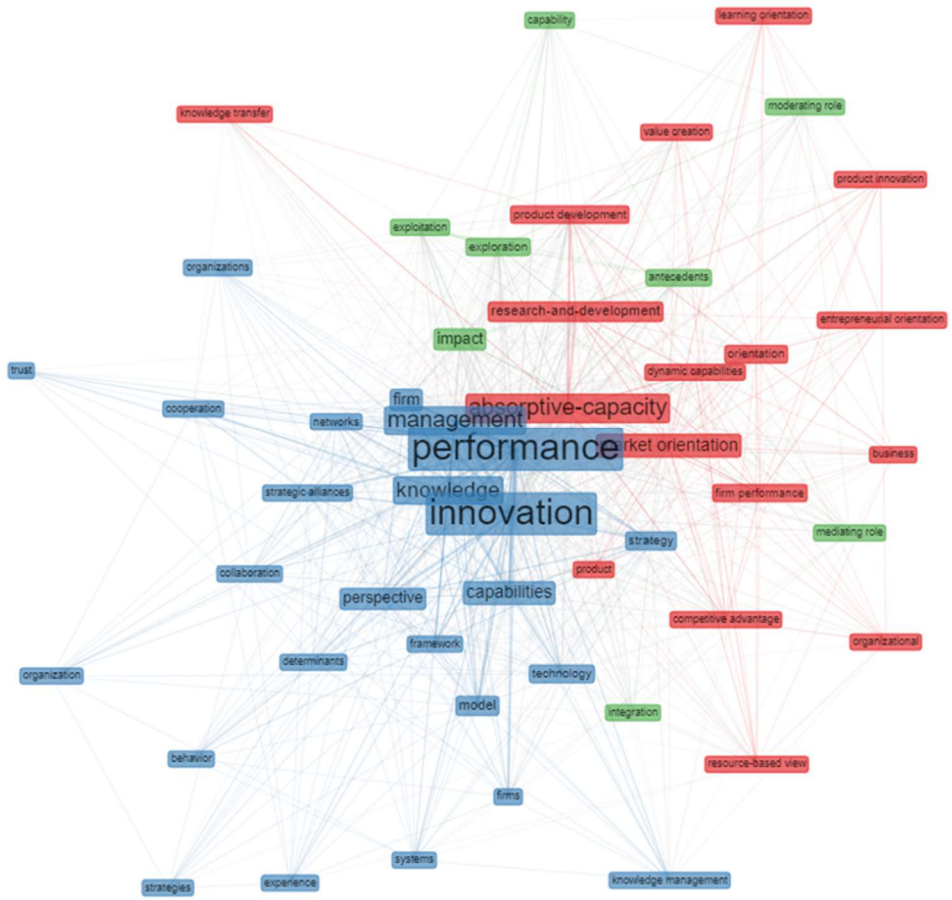
I constructed a sociogram, in other words, a co-citation network consisting of a graphic representation of the most important, significant, and intense relationships between individual actors of a network that are represented by "ties" or "nodes", which are usually denoted as circles and lines in a social network diagram (Borgatti et al. 2002). Relationships are therefore the basic unit of the social structure.

Examples of "ties" are cited articles, cited sources, or cited authors, they are elements characterized by high frequency "ties" and their size shows the frequency of occurrence. the node that has a smaller size then also has a smaller frequency. "lines" or "edges" represent the connection relationship or interaction between the ties, which exists in the same article, and their thickness reflects the degree or intensity of the co-quotation between the ties.

If the edges between the two ties are thick then it means that the connection is stronger (Fig. 1-3).

In this SNA performed on the bibliographic data from scientific publications on learning in service, it is possible to distinguish isolated nodes that have no connection with other nodes whatsoever and nodes or groups of nodes that are interconnected directly or indirectly via intermediaries. Some groups of nodes (each with a different color) may show a degree of interconnection with other groups. Although different algorithms (clustering methods) exist to identify these subcomponents, this study used the Louvain community detection algorithm. Lastly, the indices of centrality help to identify the most important nodes in a network and the propensity of two vertices that are connected to be both connected to a third vertex (fig.1-3).

Figure 1-3 Social Network visualization of KeyWords Plus (KWP) co-occurrence. The thickness of the connecting line between 2 keywords represents the strength of co-occurrence. The size of the KWP represents the index of their centrality



1.3.2 The conceptual structure of the knowing and learning process: a co-word analysis

The methodological foundation of co-word analysis is the idea that the co-occurrence of key words describes the contents of the documents in a file (Rokaya et al. 2007) The co-words is given by the frequency of recurrence of the keywords that are analyzed within the collection of articles. It is important to map the conceptual structure of a framework through the use of the keyword co-occurrences in a bibliographic collection. The number of occurrences of two keywords is the number of publications where both keywords occur together in the title, abstract, or list of keywords. It is therefore a question of using one or more index (or indices) to measure the relative intensity of these co-occurrences and to achieve a simplified representation of the networks to which they give rise.

In my collection of articles on learning and service, when the frequency of occurrence of two keywords increases, their relationship also tightens.

I mapped a co-word network by analyzing the co-occurrence frequency of keywords in my entire collection and investigated specific research areas of learning interest. The analysis can be performed through dimensionality reduction techniques or co-occurrence network analysis. Here, used a co-occurrence network to draw a conceptual structure of the field and hierarchical clustering to identify clusters of documents that express common concepts.

Results are plotted on a thematic map and evolution, by employing the top 500 KeyWords Plus (KWP a minimum cluster frequency of 5 and a minimum weight index of 0.1, divided into several clusters.

The KWPs allowed me to dig deeper into the article content as they are generated independently of the title and author keywords and include additional terms to describe article details and variety.

In the co-occurrence network, I used association strength normalization how discussed in detail by Van Eck and Waltman (2009). After, it is defined as clusters through the Louvain method. A cluster is a set of closely related nodes. Each node

in a network is assigned to exactly one cluster. The number of clusters is determined by a resolution parameter.

In order to identify how the thematic evolution took place over time, I divided the time span into three periods, taking into consideration the overall temporal distribution of the publications: 1993-2001; 2002-2010; and 2011-2020.

The interconnections between them allowed to understand if a theme could belong to a different thematic area, or it could not come from anyone (Fig. 1-3).

1.3.3 The intellectual structure of the knowing and Learning process: co-citation analysis and collaboration network analysis

Scientific publications regularly contain references to other scientific works. This generates further networks, such as co-citation or coupling networks. These networks are analyzed in order to capture meaningful properties of the underlying research system and, in particular, to determine the influence of bibliometric units such as scholars and journals. Two articles are said to be bibliographically coupled if at least one cited source appears in the bibliographies or reference lists of both articles.

I refer to the co-citation of two articles when both are cited in a third article. Thus, co-citation is the counterpart of bibliographic coupling. The historiographic map is a graph to represent a chronological network map of most relevant direct citations resulting from a bibliographic collection.

The function generates a chronological direct citation network matrix which can be plotted against several nodes of 20 to better depict the relationship among the top 20 authors included in our collection. In the co-citation network for articles, authors, and sources, the Louvain method was used as a clustering algorithm, several nodes of 50, and a minimum edge strength of 20 (approximately 5% of the entire collection of articles on learning in service).

Social network analysis, also known as network mapping, is a method to study network centralization by analyzing nodes and links.8 Scientific collaboration network is a network where nodes are represented by articles, or sources, or authors, or institutions, or countries and links are co-authorships, as the latter is

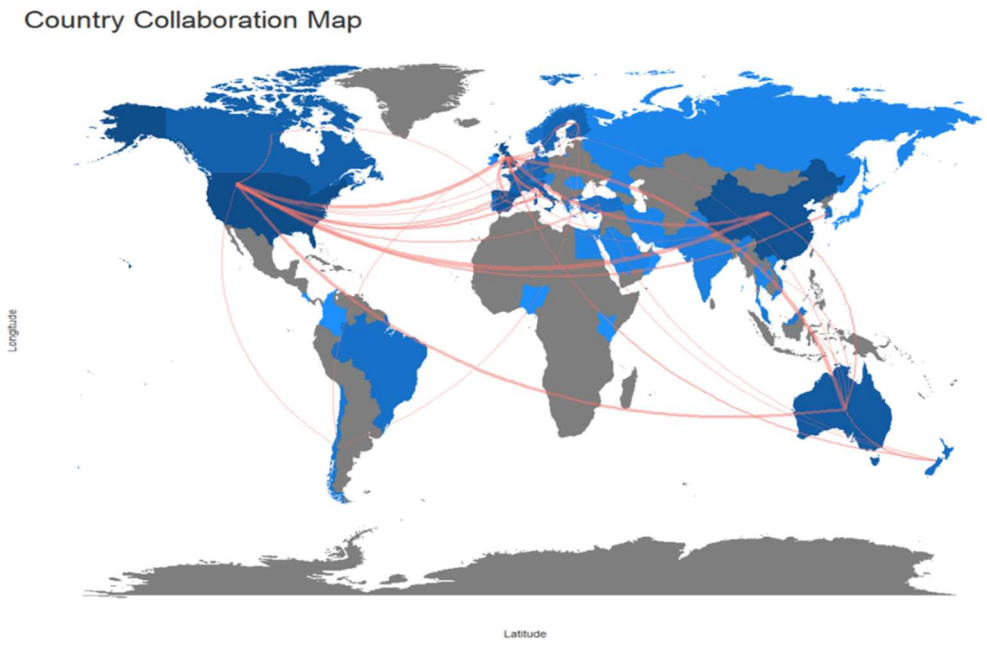
one of the most well-documented forms of scientific collaboration. Therefore, the links represent the collaboration of these nodes. The size and location of nodes depend on the total occurrence frequency of the items (eg, authors or institutions or countries). The thickness of the links between the nodes indicates the collaboration frequency of nodes. In the collaboration network among authors, or institutions or countries, the Louvain method was used as a clustering algorithm, several nodes of 50, and minimum edges of 2 to avoid isolated and "one-time" collaboration. Isolated nodes were removed.

1.4 Theory gaps

New smart technologies present both opportunities and challenges to actors in the service system (Kunz et al., 2019). Early empirical efforts (Barrett et al., 2012; Beane and Orlikowski, 2015; Čaić et al., 2018, 2019; Green et al., 2016) have shown different aspects of smart technology implementation in a different field, such as healthcare context. In the frontline service setting, smart technologies can also be viewed as social technologies when they interact and co-create value with other actors at the service encounter (Čaić et al., 2019; Wirtz et al., 2018). According to the Service Robot Deployment model (Paluch et al., 2020, Wirtz et al., 2018), service technologies will be able to deliver service tasks with almost any degree of cognitive complexity and virtually all tasks with low emotional/social complexity. By addressing calls for research in these areas of Lu et al., (2020) and Salunke et al. (2019), Frow et al. (2019) study represents the first work performed at the service ecosystem level. At the A2A level, scholars contribute to describing how knowledge integration capability plays a key role in service innovation, from the service ecosystem perspective, they suggest that the "knowledge sharing occurs within multidisciplinary teams, incorporating the views of different actors" and Salunke et al. (2019).

The relationship between smart technologies, value co-creation, learning, and Knowing is being studied and has connected scholars from all over the world as shown in Fig. 1-4

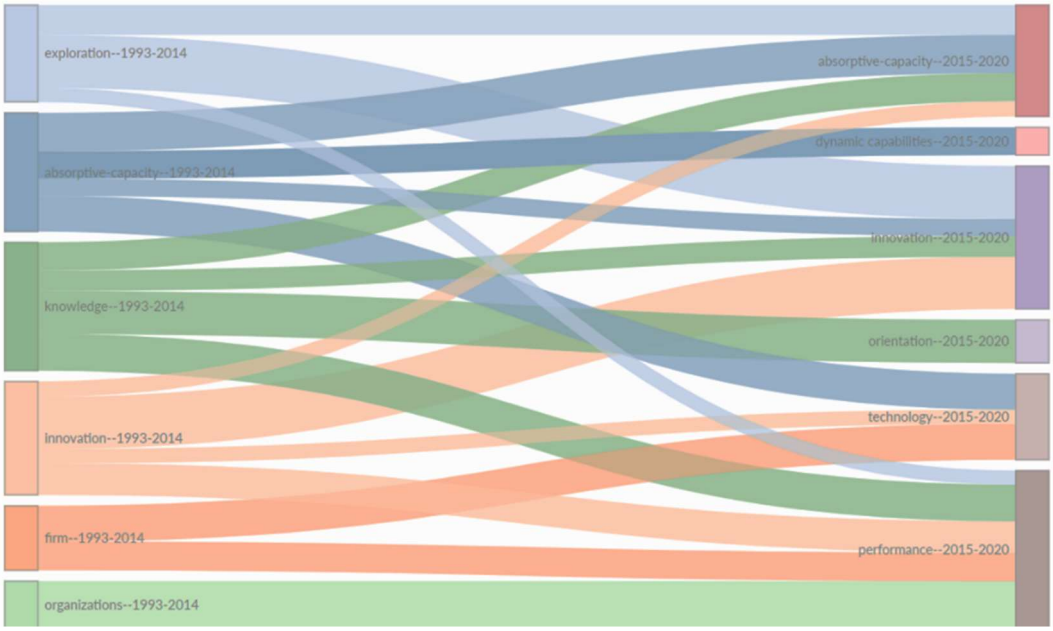
Fig. 1-4: County Collaboration Map



Source: Author's elaboration from Rstudio

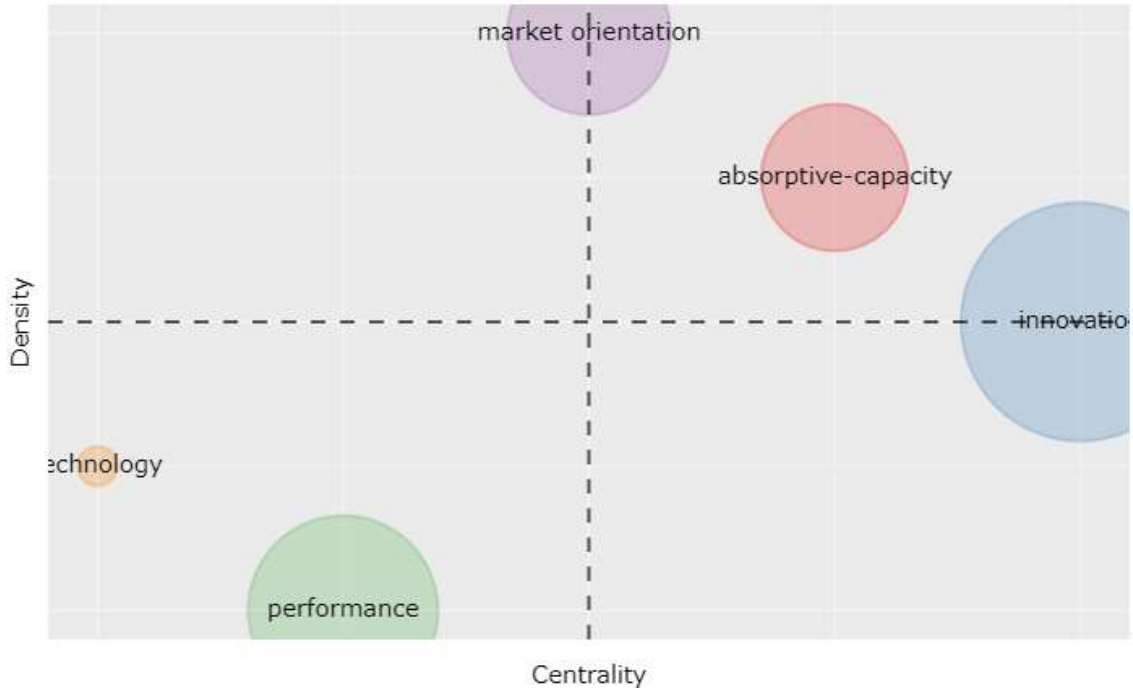
Despite the importance given, the bibliographic analysis of the literature, following the passages that are reported in the following paragraphs (from 3.1.1 to 3.1.5), has highlighted the concept of the ACAP. and a greater interest in studying this concept over the past 5 years (Fig. 1-5)

Fig. 1-5: The topics evolution



The results of the bibliometric analysis show, through the positioning map Fig1-6, that the ACAP is a driving theme in the studies on value co-creation, but the studies elaborated up to now have not defined the impact of smart technologies on ACAP and the consequent impact of "smart "Absorptive Capacity (SACAP) on value co-creation.

Fig. 1-6 Thematic map



Source: Author's elaboration from Rstudio

1.5 Research aim

The research question based on the identified gap can be articulated as follows:

RQ1. To what extent do smart technologies support knowledge-based skills, such as absorption capacity (ACAP)?

Thus, with the aim to address the first research question (RQ1), the researcher analysed the smart technology implementation in the healthcare field from an A2A perspective, by exploring the knowledge-based skills: absorption capacity (e.g.,

Salunke et al. 2020). Addressing the first research question allows identifying the main elements that shape the negative processes of relationships. Actors in an actor-to-actor network co-create in a mutually beneficial way by developing a set of practices (Lusch and Vargo, 2014); the analysis of practices allow a deeper understanding of "how value is co-created and, more broadly, how the co-creation through practices" (p. 137). However, healthy practices are still unexplored, and the study addresses this gap through research question two (RQ2).

The additional step of the research was to answer the emerging second research question:

RQ2: How the "smart" Absorptive Capacity (ACAP) affects value co-creation practices?

The next sections explain how the research was conducted.

1.5.1 Research process

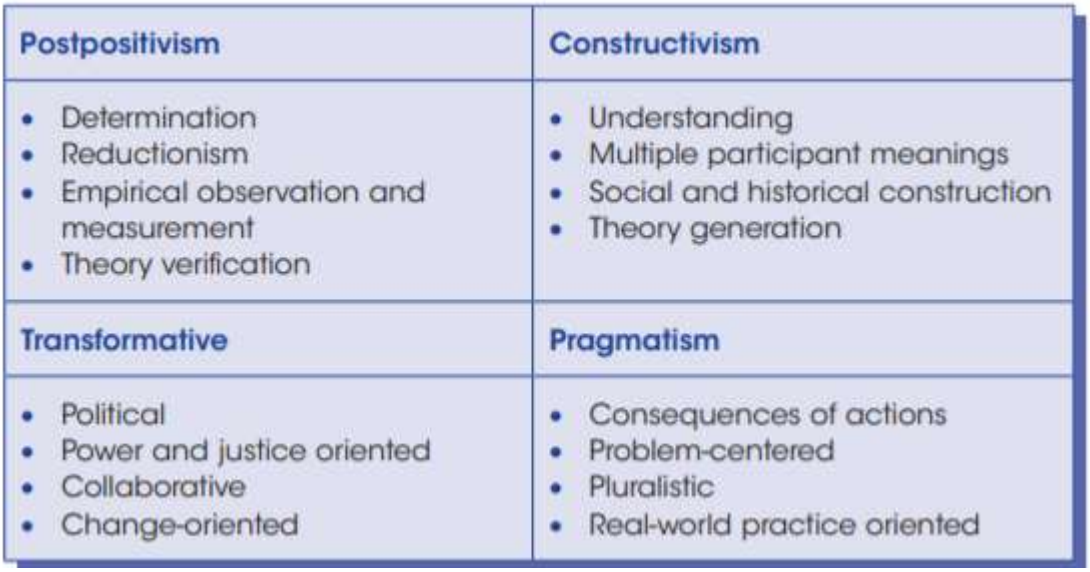
One of the most important decisions of a research project is related to the methodology through which answer to research questions. It is of fundamental importance for answering research questions in an integrative and relevant way (Holmlund et al. 2020). However, in choosing the most suitable methodology for the research project in progress, I took into account the suggestions of Gioia and Pitre (1990) that argue that "a paradigmatic approach to theory building as a means of establishing a correspondence between paradigms and theory-construction efforts, offers the possibility of creating fresh insights"

1.5.2 The paradigmatic research perspectives

Hassard (1991), Gioia and Pitre (1990), Willmott (1993) and Weaver and Gioia (1994) are representatives of paradigmatic research perspectives that affect the theory-building process. They recommend that researchers challenge and cross paradigm borders. Service scholars are faced with multiple paradigms and that it is possible to distinguish four different metatheoretical positions for doing paradigm

research: (a) positivism (b) transformative, (c) pragmatism, (d) constructivism (see Fig.1-7).

Fig. 1-7: The four dominant social research paradigms



Postpositivism	Constructivism
• Determination • Reductionism • Empirical observation and measurement • Theory verification	• Understanding • Multiple participant meanings • Social and historical construction • Theory generation
Transformative	**Pragmatism**
• Political • Power and justice oriented • Collaborative • Change-oriented	• Consequences of actions • Problem-centered • Pluralistic • Real-world practice oriented

Source: Creswell, J. W. (2014).

. The paradigms outline the nature of investigations, focusing on ontology, epistemology, and methodology (Durrheim, 2006). This research is placed within the paradigm of social constructivism. A social constructionist approach allows me to address the questions of why while preserving the complexity of social life. It is not only an approach to understanding the social constructions of research participants, but it is also a method that researchers construct during research. The Social Construction was born from Mannheim and works such as Berger and Luekmann's (1967) *The Social Construction of Reality* and Lincoln and Guba's (1985*) Naturalistic Inquiry*. More recent writers who have shown this position are Lincoln and colleagues (2011), Mertens (2010), and Crotty (1998), among others. The constructivist paradigm is based on the idea that actors seek understanding of the world in which they live and work. each actor developed subjective meanings from his experiences. The main characteristics of these meanings are variety and multiplicity. They lead the researcher to seek the complexity of points of view rather than narrowing the meanings into a few categories or ideas, as was the case in this study.

In this approach, the objective of the research is to rely on the participants' opinions regarding the situation under study. The questions are characterized by breadth and generality in such a way that participants can construct the meaning of a situation, which is usually influenced by discussions and / or interactions with other actors.
In this perspective, unlike postpositivism (where the researcher starts from the theory), the researcher intends to interpret and subsequently make sense of the meanings that the actors have of the situation studied, arriving at the definition of a theory.
In 1998 Crotty identified several assumptions to define the social constructivist paradigm (Fig. 1-8).

Fig. 1-8: Several assumptions of the social constructivist paradigm

Crotty (1998) identified several assumptions:	Human beings construct meanings as they engage with the world they are interpreting. Qualitative researchers tend to use open-ended questions so that the participants can share their views
	Humans engage with their world and make sense of it based on their historical and social perspectives—we are all born into a world of meaning bestowed upon us by our culture. Thus, qualitative researchers seek to understand the context or setting of the participants through visiting this context and gathering information personally. They also interpret what they find, an interpretation shaped by the researcher's own experiences and background
	The basic generation of meaning is always social, arising in and out of interaction with a human community. The process of qualitative research is largely inductive; the inquirer generates meaning from the data collected in the field.

The hypotheses defined by Crotty (1998) are based on the idea that social constructivism focuses on the interactions between actors and the use of language for the construction of reality. The construction concerns the subjective reality which is, however, "composed of concepts that can be shared without problems with others (Andrews, 2012; p. 41).

1.6 The grounded theory method (GT)

Qualitative research has a long and venerable history, especially in terms of disclosure (Lincoln and Guba, 1985). Qualitative research also has a long history of suffering from (often deserved) criticism that it does not adequately justify its claims, leading to worrying skepticism that qualitative researchers are engaging in creative theorization based on proving rather subtle. The essence of this qualitative research method is the possibility it offers to build analytical categories starting from data, thus respecting the phenomenon studied, following the indications that come from it.

The fundamental feature of the method is to explicitly combine the research process with the development of theory, overcoming the clear division of labor between empiricists and theorists. Grounded theory is a research methodology whose purpose is the systematic development of theory. Originating In the 1960s Barney Glaser and Anselm Strauss developed GT in response to the positivist grand theoretical work that was gaining favor in their field of sociology, it is now one of the most widely used qualitative methodologies in the social sciences (Strauss and Corbin, 1997) and identified as particularly relevant to social work (Gilgun, 1994)

During that period the Grand theory, based "on the idea that the purpose of social research is to discover preexisting and universal explanations of social behavior" (Suddaby, 2006, p. 633), was strongly criticized by Glaser and Strauss as they believed this approach to too far from real people and from the problems they try to solve in everyday life (Goulding, 2002). For this reason, they try to differentiate GT from the theory that was ‘‘developed by thinking things through in a logical manner and sought to replace it with the theory developed from rich observational data’’ (Locke, 2002, p. 19).

So, Glaser and Strauss stressed the importance of direct participant-observation by researchers and the importance of the interactions between participants and researchers. In other words, with GT, the importance of obtaining new understandings on structured relationships between social actors and of exploring how these relationships and interactions dynamically build a reality for actors was highlighted (Glaser & Strauss, 1967)

GT as a research methodology provides ‘‘a set of systematic procedures extending and significantly supplementing the practices long associated with participant observations in order to achieve their purpose of developing grounded theories of action in context’’ (Locke, 2002, p. 19). As Strauss and Corbin (1990) state: ‘‘The GT procedures are designed to systematically and carefully build theory" (p. 26). The procedure is composed of various analytical tenets, and the collective iterative cycling of these tenets lay the foundation at the holistic methodology for theory building.

GT aims instead to develop new theory inductively through a process of concurrent data collection and analysis (Glaser and Strauss, 1967). The researcher immediately analyses and codes incoming data (Glaser, 1978) and, in a process called theoretical sampling, chooses new data sources for their potential to develop emergent analytical insights. The fundamental principles of GT involve 5 phases to be carried out during the collection, analysis, and writing of data characterized by non-linearity. They are: (a) the constant comparative method, (b) theoretical coding, (c) theoretical sampling, (d) theoretical saturation, and (e) theoretical sensitivity.

In other words, GT is a general method of comparative analysis and a set of procedures capable of (systematically) generating a theory based on data (Tie et al., 2019). The “keywords” are:

- *General method:* it is a methodology, a way of thinking (or constructing) social reality and at the same time a method, a set of tools for processing data.

-*Systematically*: research is considered reliable when it has a certain degree of adherence to the interpretations to the reality studied, when it can explain phenomena through systematically organized statements and when it can provide predictions on those phenomena.

-*Generating theory:* GT underlines the intimate link between theoretical research and empirical research.

-*Based on data*: the rootedness in data is precise, punctual that under this it can be the basis for subsequent constructions, ground on which to build complex formal theories. Anchoring in the lived experience that allows the theory produced to have a practical-operational value.

While maintaining flexibility and accepting a plural notion of GT, which includes a multiplicity of approaches and orientation. it is important to recall the characterizing features of this approach. Table 1.1.1 describes the features of GT.

Table 1.1.1 The features of GT

Features:	**Description:**
Explore a process	While starting from language and meanings, it creates conceptual regularities among the phenomena to be analyzed. It aims to bring out the basic social processes and the basic psychological processes that underlie the phenomena investigated.
Theoretical sampling	It is a function of the analytical process and is presented as a progressive extension of the number and characteristics of the participants. It is an extension guided by the needs of the theoretical conceptualization work.
The simultaneity of data collection and analysis	Constantly accompany the analytical reflection with periodic returns to the field and that the collection of data is guided by analytical reflection.
Use the method of constant comparison at each level of analysis	Data are constantly compared with each other, labels generated by the first encoding, different events observed, categories, properties of categories. The comparison between different and distant elements is what prepares the ground for intuition
Build a coding starting from the data:	The theoretical construction path must always be able to be traced in such a way as to justify and explicitly explain its connection with the data from which it was generated. The coding must proceed slowly, progressively, without ever losing the connection with the empirical basis. Periodic returns to initial data.
Conceptualization, not description	Conceptualization starting from data is a trademark of GT and takes shape in the various levels of coding and analysis.
Production of memos[1] and diagrams	Writing notes on the research process represents a meta-cognitive space, imperative in this method. They represent the material that accompanies and stimulates theoretical production, but which finds no visible trace in the final product (like scaffolding).

[1] Memos are a metacognitive tool in which the reflections that accompany, support and guide find space the emergence of the theory in all its phases; they are notes, ideas, intuitions and conjectures. They are useful for recording the methodological choices that are made from time to time and keep track of the process that led to each final product of a coding. The highlight of memos is in the higher stages of coding; they are the place of constant comparison and it is important that they are present in the moments of progress of the research. A memo must always contain the date, title and documents it links to. The space where the epoch (suspension of judgment) is made explicit is instead the research diary, which allows the observer to make explicit his / her involvement within the observed contexts.

The characteristics presented in the table 1.1.1 summarize the nature of the emerging theory. it contrasts with the hypothetical-deductive method for research and proposes a method, purely empirical, to rigorously produce a theory through an inductive or abductive approach. GT, in fact, does not limit itself to collecting data and analyzing them to verify or falsify pre-existing theories but build
creatively and rigorously a theory starting from the data able to explain the investigated phenomena; it is a link between speculative theoretical production and purely descriptive empirical investigation.

According to Glaser and Strauss (1967), it is possible to stressed methodological features that distinguish it from other methods:

- *Adherence to data:* the categories are inductively based on data and negative cases, data that do not agree, are the sign of a lack of saturation of the categories.
- *Relevance*: the theory produced must be relevant, both in terms of explanatory power and conceptual density.
- "*It works"*: a GT function because it effectively explains, completely and systematically, what happens in a specific substantive area and its results are clear and above all transformable into decision-making processes, understandable by those who work in the investigated area. GT has spread to those disciplines that require rigorous, timely analysis and results that can be useful for operators.
- *Modifiability*: unlike experimental studies in which the formulation of hypotheses is cumbersome, in GT it is possible to easily modify the categories and the relationships between them, as well as add new categories as new unexpected data appears. The dynamic and procedural aspect of a theory, which must be further indicated in the direction indicated by the new data that emerged.

In 1990 Glaser and Strauss split. The trigger was the 1990 publication of Strauss and Corbin's "Basics of qualitative research". The three main criticisms that Glaser contested, defining the full conceptual description method: 1) Excessive emphasis on the technical aspects of the method; dangerous technicality that inhibits the free comparison between concepts from which only intuition can emerge; 2) Considerable shift of the method towards the verification of hypotheses rather than

towards the generation of theory; 3) forcing the analysis into pre-established categories

Over time the two authors give rise to two different approaches:

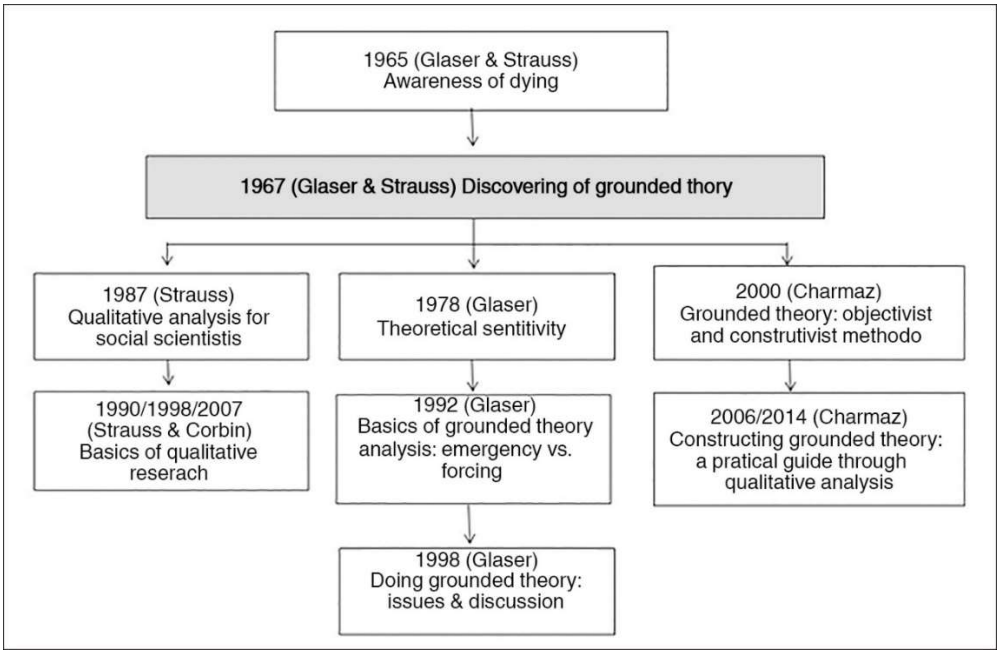
- The "classic" Glaserian approach to GT
- The Strauss and Corbin approach

1.6.1 Constructivist GT

During the last forty years and thanks to the interpretative turn in the social sciences, the positivist paradigm is strongly questioned and since the GT was founded in the period in which it existed, it suffered in some characteristics: *objectivist ontology* (realistic vision of objects investigation; to "discover" a reality that exists in itself objectively), *positivist epistemology* (the objects of reality that can be known correspond to an objective truth), *theory-reality correspondence* (isomorphism between data and investigated phenomena), the separation between researcher and his subject (the researcher is a discoverer of objective phenomena), *generalizability* (thematization of the truth of a phenomenon and identification of its power of generalizability). In reality, the new vision of reality and research implies that the researcher is considered an active co-constructor of the reality he wants to describe; objectivity in scientific knowledge is considered non-existent, there are only interpretations of it.

Clarke and Charmaz (2008) rethink the GT in the light of new perspectives: the constructivist GT. The evolution of GT is schematized in Fig. 1-8

Fig.1-8: The evolution of GT



Source: Santos et al. 2016

The interpretation of GT in a constructivist key accepts (partially) a certain cognitive relativism; it is flexible and promotes interpretative understanding. Knowledge is the result of a co-construction between researcher and subjects and this implies the following consequences: the researcher is inevitably part of the context he observes, data is not collected but produced (construction, data generation), the richest data are not facts but the tacit meanings attributed to facts, the interpersonal relationship between researcher and participants is fundamental, the interpretative dimension of the analysis is always linked to the descriptive and conceptualization processes, mechanisms must remain flexible, such as the definition of categories, the relationships between categories are complex; no definitive causal links will be identified between them, the final writing is an integral part of the analysis (Gibson and Hartman, 2014).

Clarke defined this method of developed analysis that evolves from GT, following the postmodern turn in the social sciences, Situational analysis (2003 and 2005). He proposed to broaden the traditional analysis with the use of analytical maps (situational, world, or social areas, positional). The method gives space to the individual, non-human, cultural, political, discursive, historical elements, etc. and

it is open to macrosocial leadership. Authors believed that GT is generally a set of research principles and practices that should not be taken as a whole but as a systematic and flexible set of procedural indications. The table 1.1.2 summarizes the main characteristics of the three approaches

Table 1.1.2 the main characteristics of the GT approaches

	Classic GT (Glaser 1968)	**GT full conceptual description (Corbin 1990)**	**Constructivist GT (Charmaz 2006)**
Research question	It is not a statement that identifies the problem from to study. It is impossible to define in advance (let's go openly from an area survey)	It is a statement that identifies the problem to study. Allows you to narrow and to make the area manageable investigation	Research into sensitizing concepts (Blumer), personal and disciplinary interests.
Data type	"All is data"	Indifferent. Especially remarks	Semi-structured interviews and textual analysis
Core category	It emerges almost magically and is suddenly sensed at the beginning of the end of a search	Bringing out the core category requires strong data manipulations.	There is not a single core category. There is a core category prevalent
Types of codification	Noun Theoretical	Open Axial Selective	Initial Focused Axial Theoretical

1.6.2 The research approach: the constructivist methodological approach

Following business, marketing, and management studies that recognized the concept of the socio-cognitive constructions of the reality (e.g., Edvardsson et al., 2011; Storbacka and Nenonen, 2011), I adopted the methodological approach proposed by Charmaz (2005) that use GT to explore the sensemaking through which actors construct their reality and co-creating together with the knowledge. This approach is embedded in the constitutive orientation to GT (Charmaz, 2006, 2014) and allows to unpack actors' sense-making, by explicating the thought processes of service ecosystem participants (Ellis and Rod, 2014).

The stages of the journey:

1. Identify an area of investigation: GT does not start from hypotheses to be tested; it starts from the need to explore an area of investigation (the developing of learning and knowing in-service science), taken in all its entirety and complexity, without reducing it to a few variables. Blumer (1954) suggests starting from sensitizing concepts.

2. Define the generative research question: at the beginning, the research question is a generative question ("What's going on there?" – Glaser, 1968), because the research problem cannot be clearly defined in advance, it would risk forcing the data.

3. Decide on methods and tools: Each tool has its specific consequences on the type of data that will be processed. The main tool of GT is the semi-structured interview (used in this study); as the theory emerged and categories were defined, the interviews became increasingly structured. Initially, we proceed with the choice of the first subjects and access to the field.

4. Data collection and open coding: data collection is simultaneous with coding; the first coding helps to specify the topics to be treated. Coding is the set of techniques and procedures used to conceptualize the data: the first coding operation was the transcription of the interviews word by word and the identification of the minimum units of meaning. Conceptualize the relevant passages without straining the text and staying on a descriptive level (Glasewr, 2002).

5. Theoretical sampling: theoretical sampling required starting from the first group of subjects and then progressively enlarging it based on the stimuli coming from the emerging theory;

The enlargement of the sample ended when all the categories that emerged became saturated.

6. Data collection and focused coding: The subsequent data collections have become more focused and have allowed categorizing the data in a more incisive and complete way; the result is to bring out the main directions, the themes, the interpretative categories.

7. Writing memos: Researcher's observations explained in a discursive way and analytically justified, spaces of analysis in which account of the key research issues (early and advanced memo). The role of memos is intermediate between data collection and report writing (Charmaz, 2000).

8. Theoretical coding: Conceptualization of data at a more abstract level; the level at which the relations that exist between the categories that emerged from the focused coding. The theory detaches itself from the descriptive plane and proceeds by increasing abstractions.

Four steps were fundamental:

a) Fine-tune the categories: the categories have taken shape and above all a name, not only as a title but as an extended definition that made them explicitly understandable.
b) Linking Categories: The categories produced emerged along with the relationships that link them. Three different operations: - Linking the categories and theming the type of relationship; - Development of categories based on the properties and dimensions of each; - arrangement of the categories in a hierarchical relationship by identifying macro-categories (conceptual pyramid).
c) Identify the core category: the central category that represents the main organizing concept of a research area that can be inductively identified, proceeding with the hierarchy of the categories that emerged from the data.
d) Integrate and delimit the theory: delimitation of the scope of validity of the theory and focus of the research question; thematize the basic general process.

9. Report writing: The writing process accompanied all the research phases (memo); with a further, last, level of analysis there was a long expository part of the research path. When the theory is sufficiently developed, it is worth checking the relevant scientific literature on the subject, shortly before preparing to write (Scott, 2004).

10. Research evaluation: GT corrects itself. Glaser and Strauss distinguish a substantive theory, which interprets or explains a specific problem related to an area, from a formal theory, which instead offers a second-level interpretation on a general theme/process referring to different areas.

1.6.3 Data collection and data analysis: an abductive approach

The research adopted an abductive approach that involves a recursive process of double-fitting data and theories and the use of both inductive and deductive reasoning: "[i]nduction looks for the corroboration of generalizations, patterns, outliers, and salient themes in the data, while deduction suggests a reanalysis of existing data or new data-gathering rounds (Timmermans and Tavory, 2012; p. 180). It is based on a preponderance of verbal data, but there are other types of data. The first tool from which I started was the collection process started from ethnographic observation. It consists of grasping the insiders' perspective while remaining external observers, combining the two visions, emic and ethical. I followed the guiding questions developed by Charmaz and Mitchell (2002) to read the context and bring out meanings. Then I moved on to the interview. Following the idea, the verbal data coming from the participants are what best express what is important to them; the interview allowed me to explore the basic processes and how experiences are inserted into those processes. Planning and listening (with a reflective attitude) took center stage during the data collection and analysis phase. the analysis was supported by the recording as it helps preserve fidelity to the phenomenon as it manifests itself, staying closer to the words of the participants and capturing the particularly revealing nuances (as well as encouraging self-reflection in listening). Some requested or pre-existing documentary data were useful to complete other data coming from the observations or the transcript of the interviews.

After, I switched to coding. The coding lies between the collected data and the produced theory; it is the set of procedures and techniques to conceptualize the data. it has been divided into three phases, progressive and conceptually higher and higher. It was advisable to create categories from the data and not to apply pre-existing categories, that is, interpretative grids given in advance. Applied coding is linked to naming processes and is implicated in the dimension of language and through it, through them, I built the interpretative categories which also find a root in the phenomena that generated them.

There are three levels of coding in the study (Strauss and Corbin 1990, 1998). The first encoding is the initial encoding, also called open encoding. I kept myself open to the data and opened the data in turn, exploring every theoretical possibility, while remaining adherent to them (using the participants' own words as much as

possible). I transcribed the texts in verbatim (word for word) which were encoded along four lines:

- Read and re-read all tests to set the context
- Word-by-word coding (bring out what the actor wanted to express without adding interpretations)
- Line by line coding (select minimum text segments with meaning - units of meaning)
- Compare event to event (observational data are sometimes more significant than explicit statements; I have compared similar and dissimilar episodes, to bring out what is not visible)

I printed the text leaving a margin of at least 6 cm on the right side of the sheet so that the conceptual label can be used. The use of the Rstudio software helped me to process all the encodings made, order them, and link them together.

The second coding, the so-called Focused Coding, allowed me to focus on the labeled phenomena obtained and the reflections contained in the memos, abandoning the descriptive level to arrive at the conceptual level. The purpose of focused coding is to collect concepts into categories and identify concepts at a higher level of abstraction; Here I have created a link to the categories together and these with their properties (Turner, 1981). Two main processes have characterized this process: the identification of the macro-categories, which are broader concepts, salient themes (Locke, 2001), and the linking of the categories to each other and of these to sub-categories, defining their properties. To highlight the relations, it was useful to use a double-entry table as suggested by (Charmaz and Belgrave, 2007).

After passing from the descriptive phase to the conceptual phase, I moved on to the theoretical coding. The aim is to search for the core category, the key concept, the central category that organizes and unifies the set of categories. It has great explanatory power. The two main schools have called this process selective coding (Strauss and Corbin, 1994) and theoretical coding (Glaser, 2001). The main conceptual steps of this phase were those of fine-tuning the categories, linking them together, identifying the central category, and finally integrating and delimiting the theory. I, therefore, thought about the categories identified, highlighting the relationship networks in which the categories are inserted.

Three distinct operations:

- Connect the categories and conceptualize the type of relationship that unites them
- Develop deductively and not categories with sub-categories based on the properties and dimensions of each
- Place the categories in a hierarchical relationship trough diagram and narration[2] (macro-categories and smaller categories, multiple categories-sisters, and categories-daughters)

The identification of the core category has two purposes: a) define the theory (limit the research area - the research question takes its final form) b) raising new questions and new comparisons (Strauss and Corbin 1994).

After, I moved from theoretical coding to theoretical sampling. The logic of GT does not allow for preconceptions with which to codify and build the theory; for this reason, the initial sampling of the GT expresses only the first step to enter the research field, that is when the researcher looks for people, cases, situations that allow him to start collecting data to study a specific phenomenon. From the moment the coding takes place, then labels emerge and subsequently categories, GT uses theoretical sampling, which aims to obtain data to explain, develop and expand the properties of categories and to refine the emergence of the theory. This type of sampling is therefore aimed at developing concepts and theories. Sampling, then data collection and analysis, continue until new properties emerge from the collected data, i.e. when the categories are "saturated".

Saturation was the criterion for establishing when I could stop the sampling of the cases referred to in each category. it is obtained by following the theoretical development of the categories when the data become redundant and wherever one proceeds with the collection, confirmations are continually found.

I considered a theoretically saturated category when:

[2] Narration is a particular type of memo that represents an adequate tool to accompany the process of theoretical coding. The narrative traces the path of research, from the development of the research question, through various turning points and second thoughts, to the elaboration of the categories. Telling the natural history of a research is an analytical work of theoretical construction; a similar function is performed by diagrams, concept maps and graphs (the diagrams can then integrate the theoretical coding). Making diagrams is typical of Situational analysis (Clarke, 2003).

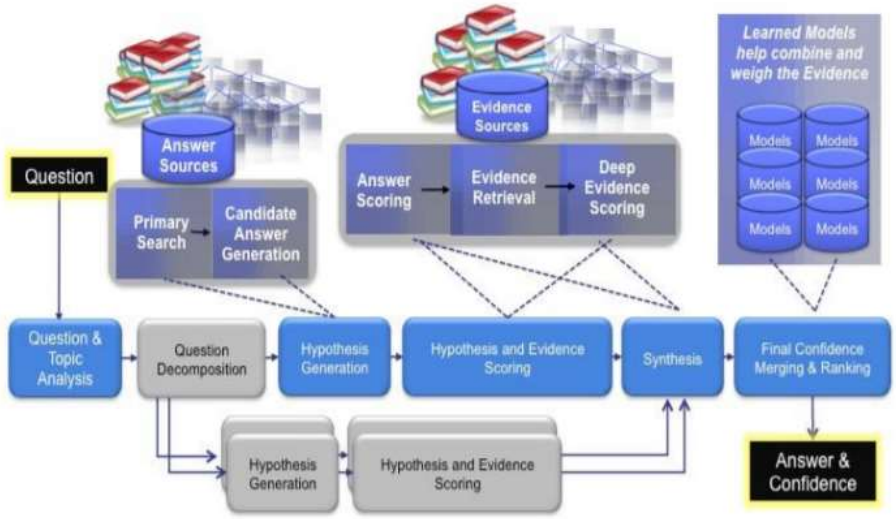
- No new data emerged referring to a category
- The categories were well developed concerning properties, sizes, and possible variations
- The relationships between the categories were well established and validated

1.6.4 Research context: IBM WATSON and Case Studies

The news that IBM (International Business Machines Corporation)[3], a US company specializing in the production of IT products, both hardware, and software, cloud computing services, nanotechnologies, and mainframes, unveiled, in February 2011, an artificial intelligence system called Watson capable of defeating its human opponents during a TV show called Jeopardy, has particularly interested in the healthcare world. IBM Watson is a cognitive, problem-solving supercomputer designed to help find answers and insights that are hidden in huge volumes of data. Watson can understand all forms of data, interact naturally with people, and learn and reason at scale (IBM, 2018). Specifically, it is a Question Answering (QA) system particularly sophisticated which, through the data entered, develops hypotheses and answers. IBM Watson is a clear example of artificial intelligence as it allows the computer to carry out reasoning like the human mind, proceeding by algorithms, or complex processes that arise from one another. In detail, Watson can read, analyse and learn from natural language, just as humans, and it makes informed, context-specific decisions as it is expected from a person, as opposed to an unintelligent search engine. It makes use of meta-reasoning and learning, trying to simulate the same cognitive path based on questions and solutions, suggested based on the knowledge inserted, and this happens through computational models. Below is the algorithm followed by IBM Watson (Fig.1-9)

[3] IBM an American multinational technology company headquartered in Armonk, New York. It was founded in 1911 in Endicott, New York, as the Computing-Tabulating-Recording Company (CTR) and was renamed "International Business Machines" in 1924. IBM is incorporated in New York and has operations in over 170 countries

Figure 1-9. The algorithm followed by IBM Watson



Fonte: IBM report 2017

Watson is available as a set of open application programming interfaces (APIs) and software as a service (SaaS) industry solution. The Watson APIs are made available as Watson services (Table 1.1.3) through the IBM Cloud.

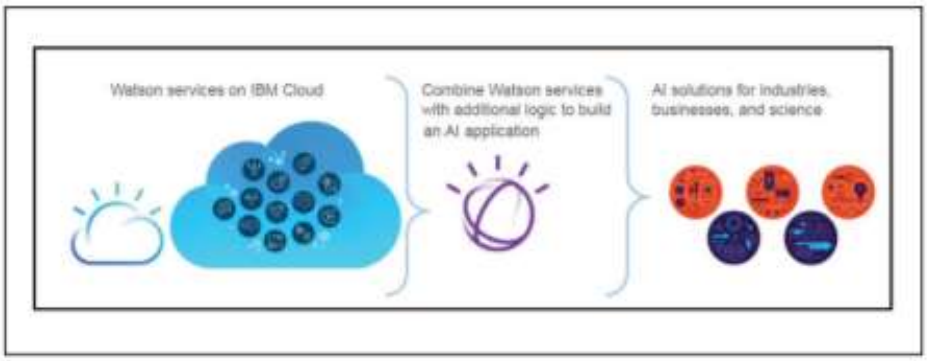
Table 1.1.3 - IBM Watson Services

Conversation	Adds a natural language interface
Discovery	Adds a cognitive search and content analytics engine.
Language translator	Translates text from one language to another for specific domains.
Natural language understanding	Analyses text to extra meta-data from content.
Personality insights	Derives insights to identify psychological traits.
Speech to text	Employs low-latency, streaming transcription.
Text to speech	Synthetizes natural-sounding speech from text.
Tone analyser	Uses linguistic analysis to detect tones from communications.
Visual recognition	Analyses the visual matter of images and videos to understand their content.
Concepts insights	Explores the concept behind inputs and identifies associations beyond traditional match.
Trade-off analytics	Helps users make better choices by weighing multiple and conflicting goals.

Source: IBM Redbook (2018).

The Cloud provides a cloud-hosted marketplace where application providers of all sizes and industries can tap into resources for developing applications. Developers can combine the Watson services with other services that are available in the IBM cloud and other providers. They can combine these services with other logics and components to build applications that are infused with Watson AI capabilities (Figure 1-10)

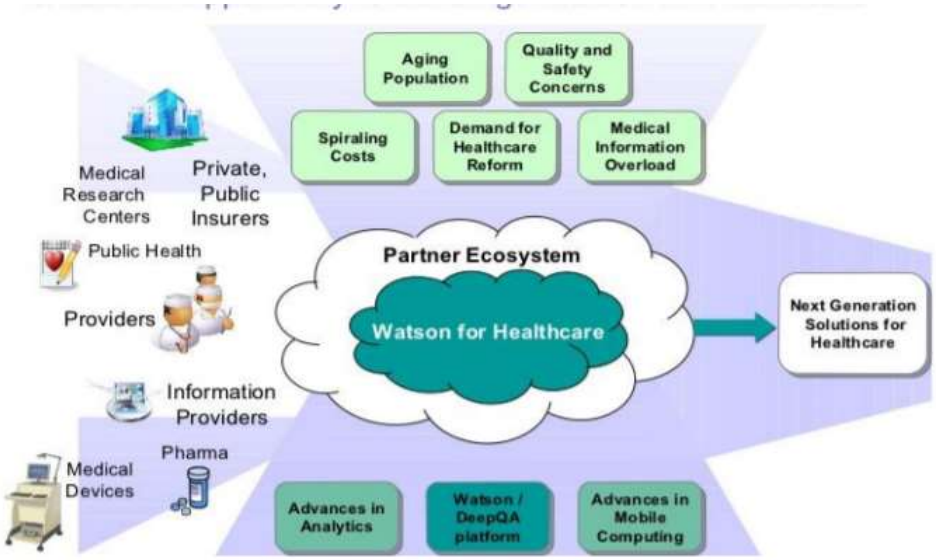
Figure 1-10.AI Solutions through IBM Watson Services on the IBM Cloud



Source: IDM Redbook 2018

Unlike the human brain, IBM Watson can implement thousands of algorithms, simultaneously, managing to extract only a small number of solutions to be submitted, subsequently, in a database that verifies them. it is interesting to note its development in the healthcare field. The IBM Watson Healthcare platform uses the full spectrum curative provided, thus increasing the possibilities of providing treatments with requisite effectiveness. It was designed for the treatment of chronic conditions and provides the collaboration of a multidisciplinary team. Its perfection is such that it allows both individual and whole care populations (Fig. 1-11). Besides, it has the 'self-learning' function that it will allow, in the future, to treat also new pathologies, unknown today.

Figure 1-11.Watson Ecosystem



In sum up, IBM Watson is o the first cognitive computing project on the market and has been considered a new frontier of computer science, managing to analyze infinite data streams, recognizing and understanding the questions asked, and providing precise and elaborate answers. As an 'intelligent system', IBM Watson also learns from the interactions it has set up in the past. In the healthcare context, it is the program interface and has been designed to anonymize, share, and combine all information, offering a view aggregate of clinical data. The use of multiple

clouds allows for the acceleration of processing in an integrated development environment enabling it to work with an ecosystem perspective.

This intelligent system is used in potentially complex human daily activities, often with the involvement of multiple actors. Technologies based on IBM Watson augment human intelligence and capabilities across the spectra of sensory perception, deduction, reasoning, learning, and knowledge. The ability to "learn" (i.e., progressively improving performance on a specific task) from data, without being explicitly programmed to do so, is hidden and the process often not noticeable to people. It results in the broadening of the IBM Watson concept and creates the concept of service and social technologies.

Technologies based on IBM Watson can be defined as “service technologies” to describe networked technology interfaces or devices that can learn from experience, enable and augment actors’ interactions and relationships.

As a first step, I aimed to find and select information-rich cases (Piekkari, Lakoyiannaki, & Welch, 2010). Thus, I identified actors involved in the adoption and deployment of IBM Watson Health through IBM Italy. I expanded the number of potential cases by participating in business events and reviewing specialized magazines, industry association literature, and official reports or communications released by national and international institutions (Han & Park, 2017). My theoretical sample comprised 34 cases analysed in different healthcare areas (e.g. Diagnostics, Therapeutics, Health Administration and regulation, Population health management). From February 2017 to July 2020, I conducted in-depth interviews with 34 companies’ respondents (see Table 1.1.4); interviews ranged from one to two hours. Data also came from secondary sources, including the whitepaper, official website, videos, blogs, and reports.

Table 1.1.4. IBM Watson Case studies

Company	Data source		Company	Data source

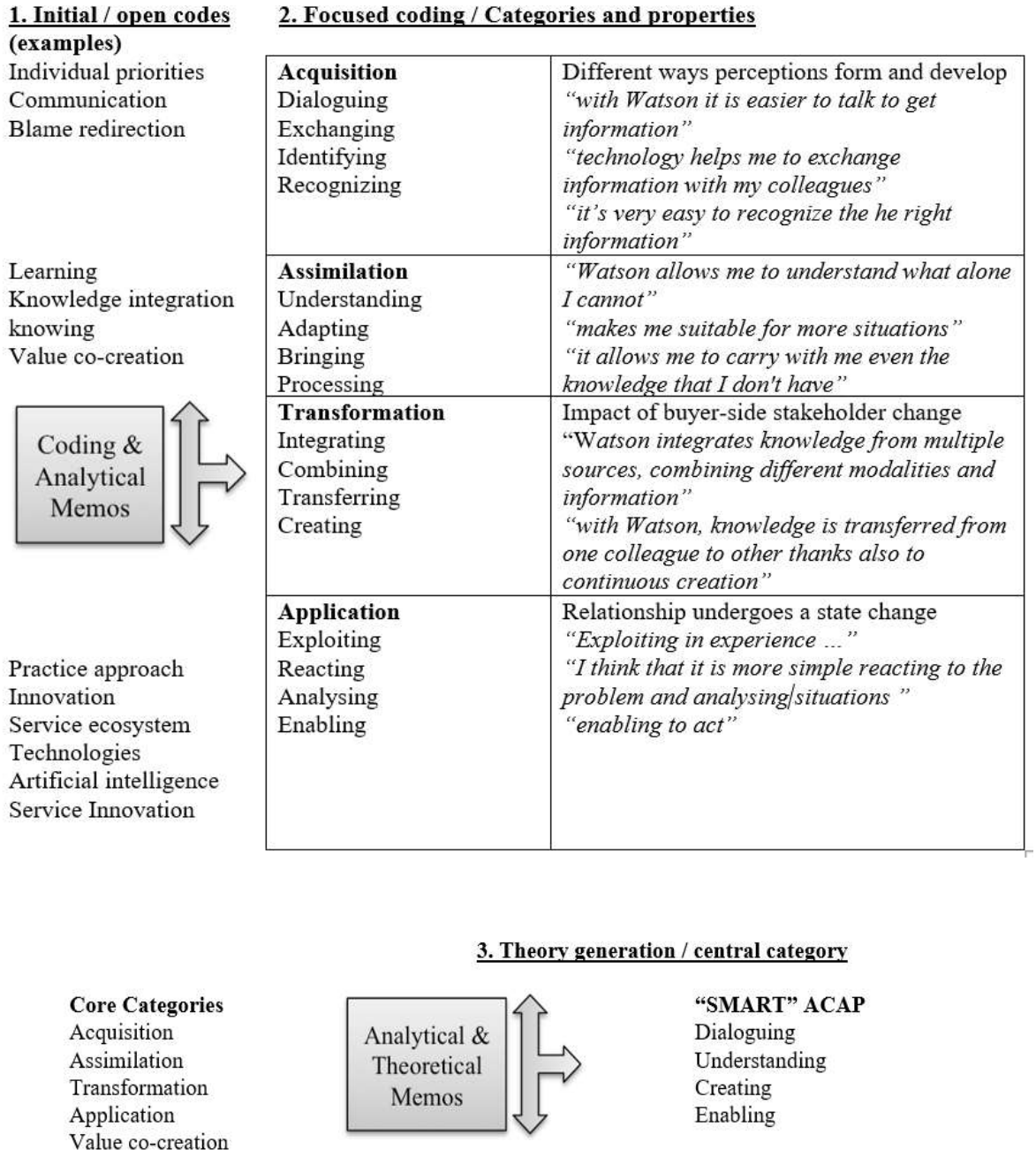
Veterans Health Administration (VHA)	N.1 interview with chief health officer (1h.) Online report Web-site		Global healthcare company GSK	N.1 Interview to Senior Vice President (1h.) Blog, Web-site
Pfizer	N.2 interview with Chairman and CEO (1h. and 1h.30m) Web-site report		Cleveland Clinic	N.1 Interview to Manager Office (1h.30m)
Harrow Council	N.1 interview with chief health officer (1h.)		Floyd health care system	N.2 Interview to Chairman and CEO (1h. and 1h.30m)
American Cancer Society	N.1 Interview to Chairman (1h.30m) Online report		Welltok	N.1 Interview to CEO (1h) Online website
Sugar.IQ	N.1 Interview to CEO (1h.)		Prudential Financial	N.1 Interview to Innovation Manager (1h) Online website
Hartree Centre	N.2 Interview to Deputy Health Officer (1h.)		DeKalb Medical.	N.2 Interview to CEO and IT specialist (1h. and 1h.30m)
Hallmark Health Medical Associates	N.2 Interview to Healthcare Manager and CEO (1h. and 1h.30m)		Barrow Neurological Institute	N.1 Healthcare Manager (1h)
ProMedica	N.2 Interview to Chairman and CEO (1h. and 1h.) Online Website		Broad Institute	N.2 Interview to data healthcare manager and nurse (1h and 1h.30m)
Schneck Medical Center	N.1 Interview to Senior Vice President (1h.) Online whitepaper		Best Doctors	N.1 Interview to CEO Online report (1h.30m)
SmartAnalyst Inc.	N.1 Interview to CEO (1h.30m)		The Aurum Institute	N.1 Interview to Chairman (1h)
Bumrungrad	N.3 Interview to Chairman, CEO, nurses (1h. , 1h and 1h.30m)		AHMC Healthcare	N.1 Interview with data health administrator (1h) Online report
Illumina	N.1 Interview with IT specialist (1h.)		Mayo Clinic	N.2 Interview to Chairman and CEO (1h)

Quest Diagnostics	N. 2 Interview with nurses and doctor (1h.30m)		New York Genome Center	N.1 Interview to the doctor (1h.30m) Online web-site
Nutrino	N.2 Interview to CEO and Manager Office (1h. and 1h.15m)		Gachon University Gil Medical Center	N.2 Interview with CEO and doctor (1h and 1h.30m)
Cooperativa Sole	N.1 interview with R&D manager (1h.30m) Online report		Medtronic	N.2 Interview to Manager Office and Deputy Health Officer (1h and 1h.15m)
The Toronto-based Hospital for Sick Children (SickKids)	N. 1 Interview to CEO (1h.)		Johnson & Johnson (J&J)	N.1 Interview to IT specialist (1h) Online report
Alder Hey Children's NHS Foundation Trust	N.1 Interview to CEO (1h.30m) Online report		Catalan Institute of Health	N.1 Interview to Manager Office (1h.30m) Online whitepaper

Source: Author's elaboration

Following Gioia et al. (2013), I first analysed the data using open coding to identify initial categories emerging from the interviews and the secondary data. The data generation and analysis activities in the GT studies proceed in parallel. Constructivist studies on GT follow three coding phases: initial focused and theoretical coding (Birks and Mills, 2015) which are closely parallel to the open, axial, and selective phases defined by Strauss and Corbin (1998). Initial coding is a completely inductive process in which codes are generated from a line-by-line analysis of the texts and gradually correlated into a category structure through a constant comparison process. The later stages of conceptualization are abductive (Birks and Mills, 2015) and have led to the abduction of the central ACAP category, as the main categories have been integrated into a composite explanatory framework (see Figure 1-12)

Fig. 1-12 Coding and Conceptualisation Process



The primary cognitive computing technology platform IBM Watson Health, with its features of the analysis of high volumes of healthcare data, understanding of complex questions posed in natural language, and proposal of evidence-based answers, can continuously learn, gaining in value and knowledge over time, from previous interactions. It can collect and manage large amounts of data to support knowledge-based skills.

Support the process of identifying and analysing knowledge to discover trends or patterns from which new ideas can be derived and valuable conclusions can be drawn.

The applied methodology elicited a series of first- and second-order categories, linked to the features of the ACAP and the related changes that IBM Watson enabled. A further level of abstraction allowed me to identify four themes associated with co-creation practices: (1) **D**ialoguing, (2) **U**nderstanding, (3) **C**reating, and (4) **E**nabling.

2 VALUE CO-CREATION & INNOVATION. A PRACTICE-BASED APPROACH

2.1 DEFINING VALUE CO-CREATION

The definition of the concept of value, as well as the definition of its creation and distribution process, has undergone various changes over time. Until the 1980s, marketing logic was characterized by Good Dominant Logic (G-D Logic), an approach dominated by the centrality of the good, that is, the physical output of the company's production process (Smith 1776). According to this approach, the good at the moment of exchange is transformed into value for the customer, for whom the latter pays a price. Value is created and supplied by businesses and destroyed by consumers. Value is embedded intangible goods and the exchange of goods represents the purpose of economic activities (Vargo and Lusch, 2004). The value

creation takes place within the company, the latter with its activities add value, which is then offered to customers, the passive subjects of this transaction. In other words, value is considered embedded intangible products and exchanged for money through transactions, the hub of all economies (Vargo and Lusch, 2008a). Starting from the second half of the seventies of the last century, some scholars, after highlighting the growing difficulty of applying traditional marketing solutions to sectors other than that of mass consumer goods, oriented their research towards the definition of theories, methods, and instruments specifically applicable to the industrial goods and services sectors (Hakansson and Ostberg, 1975; Hakansson, 1987; Grönroos, 1984, 1988; Gummesson, 1987). In 1993, for the first time, Normann and Ramirez (1993) argued that this traditional perspective (based on the activity of delivering value) is fallacious. The authors appeal to the rapid evolution that the environment has undergone, a change due to the emergence of an increasing number of service companies. Later with the development of the concept of experience. Subsequently, with the development of the concept of experience (Pine and Gilmore, 1999), the centrality of the product is gradually replaced by the figure of the customer, by the emotions and inner experiences that he/she can live in the purchasing process. The definition of customer is also evolving; the customer is no longer understood only as a taxable person who makes "the disbursement of money" but becomes a provider of skills, quality controller, co-producer, and co-marketer (Storbacka and Lehtinen, 2001). From here changes the thinking of value, based on the models of an industrial economy (p65). According to the new vision, the value co-creation process is defined in terms of co-production between companies, commercial partners, and / or suppliers and / customers. Norman and Ramirez together with several authors (Gronroos 1990, Gummesson 1991), lead to a rethinking of the company-customer interaction. The importance of the moment of exchange, so stressed in the G-D logic, is set aside and the relationship is also expressed in the moments of design, development, production, marketing, and consumption (Wikström, 1996). The knowledge, resources, equipment owned by customers are complemented by everything the company can provide. Suppliers provide the input and the company, and the company adds value to these inputs before transmitting them to the customer. Here is the birth of the customer as an active player, co-creator of experiences, whose role converges with that of the

company. In other words, the consumer is both a collaborator in the value co-creation and a competitor for the extraction of economic value (Prahalad et al. 2000, 2004, 2007). The aforementioned authors reached this conclusion by drawing inspiration from the research carried out in 1990 by sociologist Toffler who created the word “prosumers” referring to consumers who produce goods and services by participating in the production process of what they consume. In 2004, while Prahalad and Ramaswamy (2004a, 2004b) defined the dialogue, access, risk assessment, transparency (DART) framework (in which he set up the models that influence the consumer's co-creation experience, giving increasing importance to the role of relationships) Vargo and Lusch defined the Service-Dominant Logic (S-D Logic).

The studies by Vargo and Lusch (2004) show that between the end of the 20th and the beginning of the 21st century, a new dominant logic in marketing was established. If previously the focus was on tangible resources and transactions, in the period new perspectives emerged that highlighted the importance of intangible resources and the "hidden" value inherent in the creation of new relationships. For Vargo and Lusch (2004), this evolution involved the transition from G-D Logic to S-D Logic.

The latter represented and still represents a new orientation that can be applied to various forms of marketing, including those that offer, together with a tangible product, a service.

In summary, it is possible to identify two historical macro-periods: the first preceding the end of the 20th century and the second following, at the beginning of the 21st century, with a period of transition in the middle (Vargo and Lusch, 2004). In the first period, marketing models were characterized by a certain degree of static, focused on the product, on operand resources, on discrete transactions, and tangibility. During the 1900s, the main marketing players were focused on tangible products and static and discrete transactions (Vargo and Lusch, 2004). In that period, other players instead began to shift their attention towards the construction and exchange of dynamic relationships that involve consumers in the creation and exchange of knowledge, services, and, above all, of value. This value is part of the co-creation process with the consumer himself. Today, models are focused on

service and operant resources, dynamic skills, intangibility, exchanges, processes, and relationships (Vargo and Lusch, 2004).

2.1.1 The concept of value co-creation within S-D Logic

In 2004, Vargo and Lusch presented their work on forming a new dominant logic for marketing and markets: S-D Logic. The S-D Logic approach is a theoretical approach that goes beyond the traditional logic, based on the centrality of the asset, as the physical output of the production process, to arrive at a perspective that identifies in the "service" the fundamental basis of the value generation process (Vargo and Lusch, 2004; 2006; 2008). In line with the new marketing perspective, the authors emphasized the connection of value-based thinking with service orientation (Vargo and Lusch 2004, 2008a). The service, with applied knowledge and skills, is defined as a mediating factor in the reciprocal process of value creation. The basic idea is that the value of a good and / or service is not generated solely by the "producer" but is instead, even if not co-produced, always "co-created" together with other actors[4] starting from the final recipient of the 'offer. In particular, the innovative contribution offered by the S-D Logic concerns the definition of a framework that takes the form of the review and redefinition of the concepts of service, value (actors and resources), and the related creation context. The new perspective defines the service as "an application of skills through actions, processes, and performance aimed at producing a benefit for themselves and third parties, directly or indirectly connected" (Vargo and Lush, 2004). The main object of the exchange relationship is represented by the service thus defined and can be offered directly or even indirectly, that is, through the distribution of a physical good (Vargo and Lush, 2004). According to Vargo and Akaka (2009) service is the basis for social and economic exchange, and it is different from single “services” and “products” that are seen as vehicles of service provision. In this way, S-D Logic is distinctly different from G-D Logic, in which the transfer of ownership of goods (Vargo and Lusch, 2008b) and produced units of output are

[4] Actors are entities that possess the ability to act deliberately (or agency). They act within structures, such as footprints and habits acquired socially through experiences, as well as other institutions that limit deliberate actions. (Vargo and Lusch 2004)

central elements of exchange (Lusch, Vargo and O'Brien, 2007). Consistent with a reticular conception of exchange, the concept of value also takes on a different meaning compared to the interpretations provided by previous contributions. The traditional concept of value is based on the principles of industrial economics, according to which the company's goal is to offer its customers products/services of higher value than those of its competitors (Porter, 1980). According to the S-D Logic, value is not created by the company and, once incorporated into the offer, transferred to consumers, but co-created by the consumer and by the company and by other actors who have an interest in sharing available resources (knowledge and skills). This emphasizes value co-creation as the essence of service and as the unifying purpose of any business relationship (Ballantyne and Varey 2008).

One of the fundamental premises of S-D logic [5] is that value is always co-created in a process in which both the service provider and the customer are interacting and generating mutual value (Vargo and Lusch, 2004; Vargo and Lusch, 2008a; Prahalad and Ramaswamy, 2004a; Grönroos and Voima, 2013).

The distinction between producers and consumers disappears and all the actors participating in the process become active protagonists in the value co-creation for themselves and others (Vargo et al, 2008). A customer, as a beneficiary, determines the value based on their experience of use (Vargo and Lusch, 2004; Chandler and Lusch, 2011; Vargo and Lusch, 2016). In other words, the concept of value co-creation is defined concerning service, it is not an ownership of individual goods and services but something that is interactively co-created with the beneficiary in a reciprocal process (Ballantyne and Varey 2006). A value offer is therefore always the result of the interaction between business and customer, between which an Actor-to-Actor relationship develops (Chandler and Vargo, 2011). Multi-actor involvement leads to the definition of "value in context" (Chandler and Vargo, 2011). Contextual value involves multiple actors, knowledge, and other resources applied in the value co-creation process, making

[5] Service-dominant (S-D) logic, a service-centered orientation that reframes the purpose and process of economic exchange, has developed over the last 15 years into a meta-theoretical framework that advances a systemic understanding of value co-creation (Vargo et al., 2020)

the experience unique. The importance of co-creating value and its dependence on context leads to the conclusion that understanding the customer context is vital for supplier companies. Looking at service as a way of creating utility for a subject, through the implementation of activities, means relating to a multiplicity of subjects who can benefit from the relationship established with the company. A further element of fundamental importance is the interactivity of the value creation processes. According to Ballantyne and Varey (2008), companies and customers create collaborative relationships thanks to which it is possible to "serve" each other. The S-D Logic perspective highlights the central and active role of customers. Their role is important not only in daily activities but also in the development of innovations (Edvardsson et al. 2010). It is increasingly interesting to understand how customers' creative potential can be pushed and how inputs can be provided for the company's value creation activities.

In this context, communication and interaction play an important role. Ballantyne and Varey (2008) emphasize that communicative and targeted social interaction is an essential basis for the search for innovation between different actors. When service providers become proactive and interactively "bring clients and patients closer", there is an intentional co-option of skills to create something new. This phenomenon is called "collaborative development or co-development" (Edvardsson et al., 2010). Communication and dialogue improve network collaboration, leads to greater access and resourceness (Koskela-Huotari and Vargo, 2016), resulting in a higher vitality of the system (Lusch, et. al, 2017).

The relationships underlying this process are exploratory and developmental can be achieved by investing in interactive and open collaborative learning processes (Ballantyne and Varey, 2008). Furthermore, it is vital to experiment in multiple ways with different stakeholders beyond traditional roles (Payne et al., 2008).

All these observations converge on the view that multiple actors are co-creators and integrators of resources in value processes; each actor uses their applied knowledge and skills to provide benefits to another party and themselves (Lusch and Vargo, 2014) and collective problem solving and novelty creation occurs in social interaction through activity change (see den Hertog 2002, Toivonen and Tuominen 2009).

The importance of knowledge and skills and the development of competencies is

evident in many ways in the S-D Logic. It is possible to notice this importance already in the very definition of "service" which is defined as the process of using one's competences, i.e. knowledge and skills, for the benefit of another party. This puts operational resources such as interaction as well as the application of skills in dynamic and ongoing processes at the forefront (Vargo and Akaka 2009). The dynamic interactions of actors in the service ecosystem are viewed as co-creation practices that can have positive, negative, or both effects (Frow et al., 2016; McColl-Kennedy et al., 2012, 2017).

In this perspective, Ballantyne and Varey (2006) argue that relationships provide structural support for the co-creation of skills. A few years later, Ballantyne and Varey (2008) understand that the sources that generate a competitive advantage for all players are an investment in people; human skills; and their integration, development, and renewal.

The replacement of routine transactions with non-routine transactions brings out dialogic learning and creativity among the actors (Matthing et al. 2004). Therefore, it is crucial to understand more deeply the mechanisms of the complex social processes of interaction and learning between actors: suppliers, customers, patients, and end-users (Edvardsson et al. 2011) and how learning outcomes can be understood as changes. in the activity.

Until now, the S-D Logic has not been discussed in depth from how to intentionally stimulate and develop skills and relationships.

In other words, the S-D Logic and the co-creation of customer value have gained attention in different contexts (Krisjanous and Maude, 2014), as a result of requests from actors active in participating in experiences rather than passively sticking to the recommendations of the professionals (McColl-Kennedy et al. 2012). Furthermore, the involvement, the active participation of the consumer is framed in a perspective aimed not only at the co-production of the service but rather at the broader process of the value co-creation. It should be noted that the concept of value co-creation, although closely linked to that of co-production of value, must be considered in a distinct way (Vargo and Lush, 2017). In the traditional logic according to which the value, through the production process, is incorporated in the products/services, it makes no sense to distinguish between co-production and co-creation; the distinction between the two concepts is

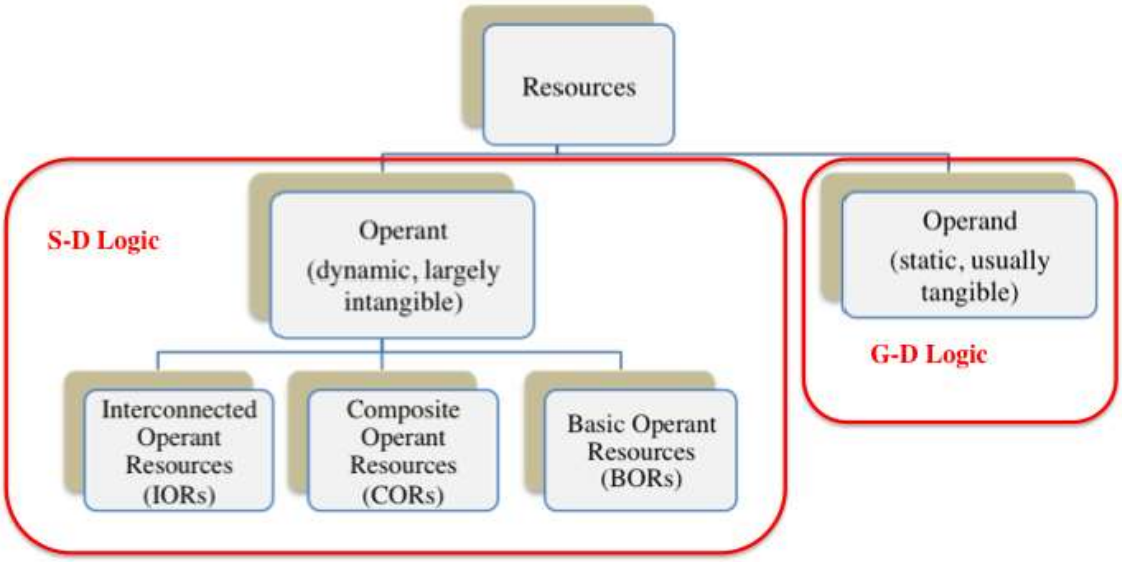
instead necessary from an S-D Logic perspective, as the consumer is a co-creator of value even if he does not actively collaborate in the production and supply of the service (Tomasetti et al. 2015). Despite the importance given, according to Hardyman et al., (2015), co-creation is a complex and not necessarily linear process due to the wide range of suppliers with different roles, skills, and competencies involved.

2.1.2 A focus on the resource integration process

The prerequisite for the value co-creation, as highlighted in the literature on S-D Logic (Vargo and Lusch, 2004; 2008 and in the setting of the Experience Logic (Pencarelli and Forlani, 2018), can be identified in the integration of the resources of the different actors of the network, transforming the customer from a passive subject to an integrator of skills, knowledge, and skills (Vargo and Lusch, 2006; 2008), a subject that qualifies the concept of value as contextualized use-value (Pencarelli and Forlani, 2018). Vargo and Lusch (2004) highlight how the consumer is not only interested in the purchase of a tangible good but how he is led to purchase "resources" that can lead to obtaining service if properly combined. In their definition, resources are understood as “competences and skills destined to generate service and a profit for both the consumer and the seller” (Vargo and Lusch, 2004). The integration of resources represents a continuous process, which has been defined as "a series of activities carried out by an actor" (Payne et al., 2008: 86). This process aims to co-create value and create new resources potentially exchangeable with other actors (Lusch and Vargo, 2014) and is conceptually aligned with “service”. In this perspective, the user of the service passes to the role of the integrator of resources (skills, knowledge, skills), this role is carried out in the various activities that can be performed with the various actors of the service network. More specifically, the resource integration process is conceptualized as the incorporation of an actor's resources into the processes of other actors (Gummesson and Mele, 2010) since "the service provided by a service system represents a subset of the resources that must be integrated to create value for another service system”(Vargo and Akaka, 2009; p. 38). The analysis conducted in the service studies focuses on two main types of resources: the "operand resource" and "operant resource" (Vargo and Lusch, 2004). Operand resources are those

tangible resources on which some form of transformation can be carried out. Operant resources, on the other hand, combine the characteristics of intangibility and invisibility. These are dynamic and not static resources like operand resources. Operant resources are linked to people, information, organizational dynamics, and relationships that are created. In the transition from the goods-dominant logic to the service-dominant logic, the most important resources, that is, those on which companies must try to base their competitive advantage, are those that fall within the classification of operant resources. The distinction between operand and operant resource allows us to specify and distinguish, as shown in the following Fig. 2-1, two different perspectives: the goods centric dominant logic and the service-centric dominant logic (Vargo and Lusch, 2004).

Fig. 2-1: The distinction between operand and operant resource



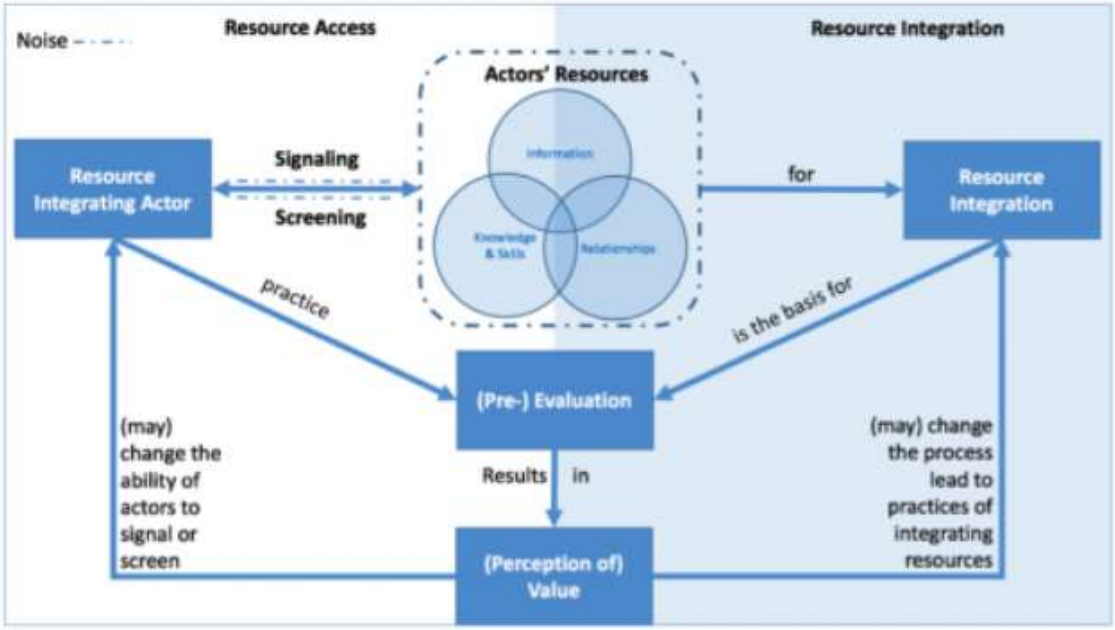
Source: Dohmen et al. (2012)

In 2011 Normann defined, for the first time, the concept of density[6], which showed a combination of resources from different sources. The density of resources

[6] Resource density involves the mobilization of resources for value creation by an actor at a certain time and place. Maximum density is the best combination of resources mobilized for an actor, in a certain time and place, to create the best possible value. In the neoclassical economic model it was stated that the productions of the retailer and

involves the mobilization of resources for the value creation by an actor in a certain time and place established. According to the author, density expresses "the degree to which this mobilization of resources for a unit ' time/space/actor 'can take place "(Normann, p. 27) and implies that every single actor at any given moment has a unique combination of knowledge and specialized resources available. Within the SD logic, all actors are integrators of resources (Vargo and Lusch, 2006; Vargo and Lusch, 2008a,) since the value co-creation implies a unique combination of resources and represents an idiosyncratic process for each actor (Gummesson and Mele, 2010).

Fig.2-2: Resource Integration Framework



Source: Chew (2015)

As shown in Fig. 2-2, all social and economic actors (and organizations) are integrators of resources (Vargo and Lusch 2008b). Hence, resources are supplemented not only by the focal company but also by private sources (such as friends and other customers), public sources (such as the government), and market-oriented sources (such as other companies and service providers) (Vargo and Lusch,

the demands of the buyer materialize through the market exchange, determining prices that efficiently distribute resources in the society (Vargo and Lusch 2008b)

2011) following their aspirations, needs, and abilities (Mele, 2009). In 2004, Vargo and Lusch made an important observation: resources are not, but they do. According to McColl-Kennedy et al., (2012) resource integration involves self-generated resources such as those generated through personal brain processes. Physical and mental skills, knowledge, and learning activities became important elements (as shown in Fig. 2-2).

For example, humans could not draw on wood as a source of energy and building materials unless they developed and applied their physical and mental abilities. Humans could not tap into deposits of iron and other minerals to produce artifacts to exploit human muscles unless they had developed the know-how to do so. (Lusch and Vargo, 2014; p. 121).

2.1.3 The actor-to-actor (A2A) perspective of S-D logic: the network approach

Value co-creation goes beyond the dyad of vision towards a broader perspective in which all participants contribute to the value creation for themselves and others (Vargo et al., 2008). In the development of SD logic (Vargo and Lusch, 2008), the original premise 9 has been changed to "[all] all social and economic actors are integrators of resources" (p. 7), using the term "actor". The expression "actor-to-actor" (A2A) replaces the expressions "business-to-business" (B2B)[7], "business-to-consumer" (B2C) and "consumer-to-consumer" (C2C). It states that economic and social exchange, seen from the perspective of actors interacting with other actors, as opposed to that of business with other companies or with consumers or any combination of distinct individual actors, allows service scholars to adopt a more revealing and transcendent worldview. In 2011, Vargo and Lusch suggested that

[7] Along with the relational approach to marketing, management and strategy, a relational approach was also developed in B2B marketing in Sweden. This vision was called the network approach and influenced many traditional schools of thought. For example, Achrol and Kitler (2012) were advocates of a network perspective, suggesting that "the very nature of the network organization, the types of theories useful for its understanding, and the potential impact on the organization of consumption suggest that a change of paradigm in marketing is not that far off.

"it's all B2B" to emphasize the fact that all actors should be conceived of as involved in resource integration and mutual service provision activities shaping value-creation networks (Vargo and Lusch, 2010). Considering the actors is less restrictive because it does not presuppose individual activities differentiated as "production" and "consumption". The adoption of a generic view of the actors, moving away from the idea of individual suppliers and / or customers, allows the overcoming of some limits and the development of a broader logic that involves the economy and society (Lusch and Vargo, 2014). The co- prefix in the term "co-creation" highlights the fact that more than one actor is involved in the process as additional resources - supplemented by customers, businesses, brand communities, and so on - are brought together to enable co-value. creation (Saarijärvi et al., 2013). The traditional distinction between "producer" and "consumer" also becomes less meaningful, as it implies that an actor (the producer) creates and supplies value and an actor (the consumer) destroys it. Instead, according to the vision centered on service, all actors are producers and consumers at the same time, since the value is mutually created within a network. In an A2A network, the actors act within a structure that presents social rules (institutional norms) and collective meanings that limit their way of acting, and at the same time, create and recreate the structures in which they operate and make decisions to create value for oneself and others. Value can be defined as an improvement in the well-being of the system and can be measured in terms of the adaptability of a system (Payne et al., 2008; Vargo et al., 2008). In 2012, McColl-Kennedy et al. (2012, p. 1) defined the value co-creation for the customer as "benefit realized by the integration of resources through activities and interactions with collaborators in the customer service network". So each actor (Vargo and Lusch 2011) experiments and shapes his context; and thus, collectively create their environment and/or service ecosystem The dynamic interactions of actors in the service ecosystem are co-creation practices that can have positive, negative, or both effects (Frow et al. 2016), -and skills to co-create value, thus "Both the service provider and the consumer perceive and experience, create, resource integration and learning" (Chan et al., 2010; Joiner and Lusch, 2016, p. 26). In developing an ecosystem perspective, the dyadic relationships connecting suppliers and customers are replaced by a valuable constellation of A2A interactions, i.e. a healthcare ecosystem (service). Actors not traditionally

considered part of the established industry (family, friends, alternative operators) become part of the network of essential private resources that consumers integrate to co-create value (Joiner and Lusch, 2016). The A2A networks are therefore based on the concept of exchange. It is useful to underline the importance of different general types of exchange and exchange institution:

- The restricted exchange has a dyadic and reciprocal nature (Vargo and Lusch 2011): actor A gives and receives from actor B, who in turn gives and receives from actor A. These actors are labeled in various ways, such as companies, organizations, employer job, employee, customer, buyer, wholesaler, retailer, manufacturer, investor and shareholder (Michel, et al 2008). The general proposal of the restricted exchange focuses on each actor who earns or is in a better position, due to the exchange, which takes on a mutualistic character. For both parties to improve their situation and develop the relationship, it is necessary to focus attention on concepts such as mutual trust, equality, and fairness. The focus is always based on the G-D logic, in the sense that the repeated exchange is equated with restricted economic transactions, subsequently renamed "relationship". The S-D Logic perspective on relationship transcends restricted exchange.
- The generalized exchange, at least three actors are involved who do not exchange directly with each other, but through another actor (actor A gives to actor B, actor B gives actor C and 'actor C, in turn, gives actor A) (Vargo and Lusch, 2011). Actors do not directly provide benefits to each other but do so indirectly (Nilsson et al., 2014). In this situation, the direct exchange is neither symbiotic nor reciprocal, although, in the end, everyone benefits from it. In short, the symbiosis is consequent but not reciprocal. Often the actors undertake a generalized exchange in organizations, but it can also take place in families. The concept of generalized exchange occurs regularly in the workplace in organizations, where many of the services performed cannot be effectively and directly compensated by direct dyadic transactions based on exchange value. Interdependent actors who work together and exchange services with each other know that members of another team do not compensate them directly, rather the organization will provide the right compensation (rights to the service). The generalized exchange also allows

the organization, through its own culture and institutions, to allow workers to carry out activities that are not directly aimed at the market (or reciprocal by nature). Generalized exchange is not an exclusive feature of internal exchanges within companies or families but also occurs on the market (Lusch and Vargo, 2014).

- The complex exchange is "organized by an interconnected network of relations" in which at least three actors are needed between which direct exchange occurs at least once for each of them (Lusch and Vargo, 2014). Consider what has been defined as distribution channels, marketing channels, or supply chains, but which are defined in the S-D Logic as constellations of values or ecosystems of services. Actors are almost always part of a complex exchange system, particularly over time as they and others become more specialized. This does not mean that they are always able to recognize the complexity of the trading system (Lusch and Vargo, 2014). It could only succeed if it were able to take a broader perspective, identifying their position in the trading system about other actors and resources.

According to Karl Polanyi (1957) to facilitate the exchange it is important to include the concept of "Exchange institutions". The actors involved in an A2A network collaborate, cooperate, co-produce and co-create through the development of social practices that contain a series of fundamental rules, procedures, and/or methods for the constitution of certain meanings and/or actions. Thus, the single actor exists in a network of interdependencies with others which, at the same time, allows and limits his development and change (Håkansson and Ford, 2002). These practices often develop over a long period, allowing actors to coordinate their creation process for mutual benefit through a service-for-service exchange. The idea that value creation occurs online dates back to studies such as those by sociologists Granovetter (1973) and Burt (1992); however, S-D Logic has added new insights to these network conceptualizations. They also help to understand how value has been co-created and how markets can be co-created through specific practices, based on interaction. The structure of a supply network is made up of service providers who manifest interactions at various levels: direct interactions, at the first level, and indirect interactions at subsequent levels. These interactions, at various levels, also characterize the beneficiaries of the services. The interaction between

the actors is the predominant element and the actors who provide the service and those who benefit from the service get feedback and learn from each other the validity of their respective value propositions. The actors in the network are therefore characterized by weak links between them that create a fluid and adaptable macrostructure; therefore, the network perspective seems useful for enabling opportunities that may not otherwise be observable (Lusch and Vargo, 2014). In this regard, the development of the model proposed by Vargo (2008) is provided through the conceptualization of the value co-creation in an A2A network, framing the interaction as the most relevant antecedent to the integration of resources - the other process which shapes co-creation (Gummesson and Mele, 2010). To integrate the model of value co-creation, Gummesson and Mele (2010) have provided five propositions (Pn) that explain the main elements and characteristics of this process. The five (Pn) are:

P1 Interaction allows an actor to enter and support the value creation processes of other actors

P2 Interaction is an antecedent to the integration of resources as phases of an endless spiral.

P3 The integration of resources is the main mechanism for the value co-creation

P4 An actor's resources become valuable when they are matched and positioned in a value-creating network to provide benefits to all actors in the network.

P5 Matching is the guiding principle for resource integration; the value creation potential of an actor arises from his ability to fit together, to position himself in a network, and to contribute to its success and evolution.

Interactions take place within a network of relationships between actors through dialogue, the transfer of resources, and learning.

- Dialogue promotes interactions based on shared meanings that make knowledge and resources available from different parties.
- Resource transfer involves access to different resources which are further matched together.
- Learning is the natural result of dialogue and the transfer of resources as these processes favor the creation of new knowledge (explicit and tacit).

Therefore, interaction is the process that precedes the integration of resources in which the integrated resources can be complementary, similar, or a mix of both. By adopting this vision, matching becomes the fundamental principle for resource integration as it contributes to a successful value co-creation process.
Similarly, adopting a client-based perspective, McColl-Kennedy et al. (2012) defined co-creation of customer value as the "benefit achieved by integrating resources through activities and interactions with collaborators in the customer service network" (p. 375). Jaakkola and Hakanen (2013) have conceptualized the value co-creation as a collaborative process that takes place at three interrelated levels: the individual, the relationship, and the network level. They adopted the ARA (Actors-Resources-Activities) which created predefined models of interaction among relationship partners (Håkansson & Ingemansson, 2013; Håkansson & Johanson, 1992; Håkansson & Snehota, 1995; Lenney & Easton, 2009).
In sum up, according to Vargo and Lusch (2008), the interaction with A2A takes place to provide mutual services and benefits. It is intended as a service interaction and allows an actor to enter the value creation processes of other parties to support and benefit from them.
Socialization processes are enabled by learning based on interaction and conversation aimed at mutual benefit. Thanks to the processes of socialization as a cross-fertilization of tacit and explicit knowledge and activates the spiral of knowledge within the network (Nonaka 1994). The continuity of the processes described above allows the actors to exchange information and transfer resources to produce new knowledge, both explicit and tacit. In this way, the learning processes are developed to allow you to interact better and reduce the costs and ineffectiveness of relationships. According to Senge (1990) and Kim (1993), shared information is the basis for learning during the value creation process, favoring the development of common mental models (Senge 1990; Kim 1993). The sharing of mental models generates a vision that must be adopted by all the actors of the network. The interaction is a core for the action and interpretation of the actors of the surrounding world (Berger and Luckmann 1991). During the interaction process, the actors participate in the formation of processes, the

development of practices, and the construction of social artifacts as steps to build networks of social reality. Therefore, the interaction on the net is a co-creation engine and a "generator of experience and value" for the whole network (Ballantyne and Varey 2006). Although defined, the concept of "value network" can be introduced.

According to Lusch et al. (2010), a network of values is a spatial and temporal structure that spontaneously perceives and responds to a widely coupled value that proposes social and economic actors who interact through institutions and technology, too:

- co-produce service offers
- offers of exchange services
- co-create value

The notion of social roles as creatively negotiated in value networks can throw a different light on how value co-creation occurs.

2.1.4 The service ecosystem approach and the role of the institution

The network concept captures much of the complexity of value creation, but it is still quite static. The concept of "system" is more suited to dynamic exchanges of services. Greater dynamism and realism entail greater complexity[8] which, however, must not be avoided, because systems reflect human exchanges, markets, society. The S-D Logic perspective tends towards isomorphism. The concept of

[8] It refers to the characteristics of a system (Complex), conceived as an organic and structured aggregate of interacting parts, according to which the global behaviour of the system is not directly derivable from the sum of that of the individual components, but depends on the way in which they interact . (the meaning assumes different connotations according to the discipline in which it was: Physics, computer science, mathematics, sociology, business). The perspective of complexity is defined in words by the physicist Capra (2005): "the more we study the most serious problems of our time, the more we become aware that it is not possible to understand them separately. They are systematic problems, which means they are interconnected and interdependent. We have to consider these problems as facets of a single crisis which is largely a crisis of perception".

"ecosystem" emerged in the discussions, it derives from biology and zoology, where ecosystems are made up of vaguely interconnected actors who are dependent on each other for survival; addiction cannot be direct, one-to-one, but rather indirect. Each actor within the system must obtain resources to evolve and must model the local environment in which other actors operate. The not only competition for resources is common, but also cooperation in sharing resources, like other forms of "win-win" resource exchange. Coevolution is therefore central to natural ecosystems. Service ecosystems begin with interactions between A2A and with the exchange of service, that is what constitutes the micro-level of the service system. The interactions and exchanges bring out structures and a meso level in addition to interacting directly, the actors participate in many indirect and distant exchanges involving other subjects, who in turn participate in the vendor system and the other actor as a buyer. This vision has been overcome by the consideration that all the players are instead a source of integration of both supply and demand resources: they offer a service and at the same time are beneficiaries of it.

The ecosystem perspective was developed in the S-D Logic theory. In 2008 Maglio and Spohrer, adopting S-D Logic as the philosophical foundation of service science, introduced the concept of service systems defined as "value configurations of people, technology, value propositions that connect internal and external service systems and shared information. " (p. 18) which represents the basic unit of analysis of the service. The analysis and study of the service requires a less structured planning, a less passive classification of the actors, less dyadic in the relationship and less sequential in its process. When many actors are interconnected and new information arises through data analysis and different levels of learning, the flows of activities may not always be predetermined or follow the original project. The interactions between the actors are more complex. To understand the evolution in the context of the service, in a direct and effective way, there is a need to adopt a mentality of the ecosystem of services (Langley et al. 2020). Recognizing the importance of the social context that enables and limits the complex network of interactions between different actors, Vargo and Lusch (2010) have introduced the concept of service ecosystem into the S-D Logic. The framework of the service ecosystem (Vargo and Lusch, 2004, 2008, 2016) moves very far from the idea of a

linear and sequential flow of value co-creation. According to Giddens (1984) an ecosystem perspective is a mutually constitutive perspective of structure and action, and here institutions represent not only the rules of the game (North, 1990) but also the result and the social context of human action. Using an A2A designation, Vargo and Lusch (2011) argue that "at an appropriate level of abstraction, all actors are basically doing the same": that is, they co-create value through the integration of resources and the offer of services. The ecosystem vision can provide a framework for the study of larger systems or the interaction and co-creation of value between multiple service systems (Vargo & Lusch, 2017). This vision includes heterogeneous service systems able to interact based on their shared intentions (Polese et al., 2017; Taillard et al., 2016) to achieve a common purpose, such as creating mutual value, creating new opportunities. Service ecosystems are nested within three levels: micro, macro and meso (Akaka et al., 2015). The micro level - focused on the interaction between individual actors - allows an ecosystem of services to emerge through the meso and macro levels. Taillard et al. (2016) suggested the adoption of the verb emerge because it is “a process that results in new properties that are more than the sum of the parts that constitute it” (p. 2972). Through the service ecosystem, service systems act as resource integrators seeking to achieve a better match (Gummesson and Mele, 2010). S-D Logic as a perspective for service has been extensively discussed (Vargo & Lusch, 2004; 2016; 2017; Vargo & Akaka, 2012), although less has been written about the service system models that may emerge once connectivity and relationships between more informed actors are on the rise. The basic premises of the ecosystem perspective have been explained at length (Vargo & Lusch, 2004, 2017; Vargo & Akaka, 2012) and service scholars have defined the ecosystem metaphor as "the description of the connections between self-regulation of actors capable of integrating resources and guided by shared institutional logic "(Lusch and Vargo, 2014).

The actions and interactions between the actors continuously support and reproduce the system by socially constructing logic or institutional schemes that influence the activities and exchanges (Singh., 2011, Koskela-Huotari and Vargo, 2016). The basis of any exchange is service. Service is the application of skills for the benefit of another. In this perspective, all economies can, therefore, be understood as economies of services. In further developing this topic, Vargo and Lusch (2016a)

defined a service ecosystem as a relatively autonomous and self-regulating "system [s] of actors integrating resources linked by shared institutional arrangements and creating mutual value through the exchange of services "(pp. 10-11). The advancement of service science and the study of service systems are based on a theoretical foundation of service-by-service exchange[9] (Maglio & Spohrer, 2008; Vargo & Akaka, 2012). In this perspective, service science promotes a more macro perspective on the co-creation of value (Saarijärvi et al., 2013). Value is co-created by multiple actors, who can integrate their skills, knowledge, and resources with those of other actors. The integration of resources follows the recognition of the distinctive skills of each actor, and this recognition helps in the qualification of individual actors in the service ecosystem (Mele et al. 2018). Service ecosystems are a useful framework as they define how, why, and when a system is a service ecosystem (Langley et al. 2020), i.e. when the flow between actors through the integration of resources and exchanges of services that they require learning, communication, and coordination (Maglio and Sphorer, 2013) based on the co-creation of reciprocal understandings. An important aspect of service ecosystems is shared symbols, defined as the combination of signs and practices, which allow the coordination of interactions, communication, integration of resources, and, finally, the determination of value. Such practices take place within institutions, i.e. through norms that are both explicit and implicit (Furubotn & Richter, 2005; North, 1990). Hence, to implement the concept of service ecosystems, Vargo and Lusch (2016) explored the role of institutions. they are dealt with institutional agreements but can be mutually incompatible. Complexity arises from the conflict between institutional arrangements (Greenwood, Raynard, Kodeih, Micelotta, and Lounsbury, 2011). Jacobs (2008) identifies complexity as a property that derives from the characteristics of multiplicity (high number of components) and relationality (high degree of interconnection between components). Therefore, all tools that have the potential to disrupt how entrenched actors conform to specific institutional

[9] An organization can be seen as a habitat for micro-specialized actors who provide a service in exchange for a salary or an economic compensation paid by the company, instead than by the recipient of the service. When these micro-specialized actors perform a service, but not in a direct exchange, they can lose sight of the service-for-service nature of the exchange.

arrangements, and when such disruptions occur, a system can exhibit uncertainty and conflict (Langley et al., 2020).

2.1.5 The practice approach to value co-creation

The practice theory (Reckwitz, 2002), has been used previously by management and business scholars to analyze different aspects of value formation, including markets, organizations, consumption, symbolism, brands, and value co-creation (Akaka et al., 2014; Araujo, Kjellber & Spencer, 2008; Echeverri & Skålén, 2011; Schau, Muñiz, & Arnould, 2009).

Following the practice-based approach (Gherardi, 2006), existing ways of doing, knowing, and connecting are changing, and new practices are emerging in the service ecosystem. Practices are not simply synonymous with actions; they can be conceived of as "more or less routinized actions, which are orchestrated by tools, know-how, images, physical space and a subject who is carrying out the practice" (Korkman, 2006; p. 27). In other words, social reality fundamentally consists of practices (Schatzki et al., 2001), which are produced and reproduced through everyday actions.

In service literature, co-creation practices emerge when actors engage in activities through interactions in a specific social context (McColl-Kennedy et al., 2015). "Practices" in turn are constitutive of the socio-material world (Orlikowski, 2002), in which human agency is shaped by and also produces, reinforces, and changes structural conditions in a recursive process of reproduction and transformation. As Ostrom et al. (2010, p. 5) note, "we define service science as an emerging interdisciplinary field of inquiry that focuses on fundamental science, models, theories, and applications to drive service innovation, competition, and wellbeing through practices of value co-creation". Service literature views value as being created when engaging in the service leaves actors better off or increases their well-being relative to their initial conditions (Grönroos, 2008; Prahalad and Ramaswamy, 2004).

In studying practices in service systems, scholars focused mainly on consumers and end-users (McColl-Kennedy et al., 2012), understanding their crucial (active) role. Still S-D logic views on consumers and end-users not as passive but

active actors more in the curing process (Vargo and Lusch 2004;) and the active involvement of costumers is fundamental to reach positive results in coping with chronic diseases (Holman and Lorig 2000). Yet, to date, there is little research about service practices.

2.2 DEFINING INNOVATION

Innovation is essential for organizations[10] in today's VUCA (Volatile, Uncertain, Complex and Ambiguous) world (Cook, 2016; Schoemaker, Heaton, & Teece, 2018; Singh, Sinha, Mukunda Das, & Sharma 2019; Szutowski, 2019).

The definition of innovation in the course of history has taken on different facets, starting with the economist Joseph A. Schumpeter, the first to give an exhaustive definition of what innovation is, in 1912 introduces the "theory of value" in which he defines development as a "distinct phenomenon, unrelated to what can be observed in the circular flow and the tendency towards equilibrium. It is the spontaneous and sudden change of the flow channels, the perturbation of the equilibrium that alters and displaces the previously existing state of equilibrium "(Schumpeter, 1942). According to Schumpeter, innovation is defined as a force that destroys the old competitive context for creating a completely new one. Innovation is, therefore "a creative response that occurs whenever the economy, a sector or the companies of a sector offer something different, something that is outside the existing practice (creative destruction)" (Schumpeter, 1942). In the structured world of S-D Logic, the environment is the seat of innovation and structural transformation is often the means.

The integration of resources can be used to describe the innovation process. To do this, three sets of simple interconnected ideas are needed: (1) all economic and social actors are integrators of resources, (2) the integration of resources results in the creation of resources, (3) when new ones are created. resources, these are integrated with others and the process of integration and creation of

[10] In the past, entrepreneurship was considered "the hero of innovation". (Pizzato, 2014)

resources is repeated. This process forms the basis of what Brian Arthur (2006) describes as the nature of technology and its evolution. Resources and their integration produce additional resources which are often progressive innovations; occasionally, these are radical innovations that result in new markets. The markets are not static or fixed, but they are limitless because the extent of the integration of resources by human actors is unlimited and constantly expanding: the more resources that are integrated, the more resources to integrate are available. The innovation process cannot be planned rationally and does not consist so much in inventing new things, but rather in identifying the opportunities to de-institutionalize and the practices of re-institutionalization.

Moving innovation into the practice realm means going from the outcome or objects to the very process—that is, innovating as a verb, about the emergent process (Mele et al., 2017; Russo-Spena and Mele, 2016). Here, innovating can be framed as a texture of practices (Mele and Russo-Spena, 2017), such that the set of practices rests on other practices performed by actors who integrate material and social resources (e.g., knowledge, tools, languages, artifacts) to improve service provision and actors' well-being

2.2.1 Service innovation

According to Carlborg et al. (2014), service innovation research is currently in a 'multidimensional phase'. The concept is defined broadly to include both co-creation value processes and combinations of novel services and products. Toivonen and Tuominen (2009) affirmed:

'A service innovation is a new service or such a renewal of an existing service which is put into practice and which provides benefit to the organization that has developed it; the benefit derives from the added value that the renewal provides to the customers. In addition, to be an innovation the renewal must be new not only to its developer, but in a broader context, and it must involve some element that can be repeated in new situations, i.e. it must show some generalizable feature(s). A service innovation process is the process through which the renewals described are

achieved.' (Toivonen and Tuominen, 2009, p. 893.) This definition is based on based on the Schumpeterian view of innovation.

Here, newness has a relative nature. In other words, newness put into practice might be an innovation even if it is a common practice in a different context compared to the one where it was developed (Crossan and Apaydin, 2010). For example, a self-service practice may be an innovation in the healthcare field even though it has been widely utilized in retailing.

A limit to the definition of Toivonen and Tuominen (2009) is the view of innovations in individual services.

However, in the most recent literature are stressed three service-specific issues, to consider during studying service innovations:

1) An increasing number of innovations are systemic by nature, including strong social and value aspects (Bessant and Maher, 2009; Hartley, 2005; Kivisaari et al., 2013). The innovation literature also uses the concept of social innovation to refer to collaborative innovation processes addressing complex economic and social problems (Rubalcaba et al., 2013; Ruiz Viñals and Parra Rodríguez, 2013). It has been noticed that the outcomes of social innovations usually arise in the form of service innovation, but the processes of creation and diffusion take place at different levels (Harrison et al., 2010), and identifying the transition from one service to another is most difficult (Preissl, 2000). This phenomenon is linked to the second service-specific issue: the important role of incremental innovations.
2) Incremental service innovation refers to improving or changing individual characteristics in the outcome of processes of the service (Gallouj and Weinstein, 1997). According to Perk et al. (2012), radical service innovations are rare and would mean opening an entirely new market or creating a totally new service system with the related new processes and benefits. So, it is possible to notice a double vision: on the one hand, the representatives of the neo-Schumpeterian view have highlighted that even the most radical discoveries are a recombination of existing things (for example Nelson and Winter, 1982; Fleming and Sorenson, 2004), on the

other hand, it has been noted that incremental innovations, including incremental service innovations, can gradually lead to more radical changes as the effects of small novelties accumulate (Jensen et al., 2007).

3) Often service innovations include, not only changes in the characteristics of the service offering, but also a novel way to integrate social, technical, or organizational resources (den Hertog, 2002; Edvardsson and Olsson, 1996; Edvardsson and Tronvoll, 2013; Lusch and Nambisan, 2015). The inter-mingling of these elements can be facilitated by smart technologies. The digital intelligent process offered the possibility to automatize many stages in the process and provide personalized service. This has required respective changes in the firms' organization, their social capabilities, and technical communication channels, and actor relationships and interaction (den Hertog, 2002).

To sum up, it is a possible state that the outcome perspective has dominated the discussion: the 'what' question of the new service development has been the focus. However, next literature on the systemic nature and social interactions in triggering, creating, and adopting innovations have drawn attention to the process perspective: the 'how' question (Crossan and Apaydin, 2010; Edvardsson et al., 2011; Grönroos, 2006; Lovelock and Gummesson, 2004; Sørensen et al., 2013). It has been pointed out that the core of service innovation may be the collaborative processes themselves, which include a change in the allocation of resources between the provider and the users (Russo-Spena and Mele, 2012). Focusing on the healthcare field, the demographic change, the birth of the so-called silver economy, the increase of diseases, and technological development has led the scholars of the services to a more proficient analysis of the latter in the field of health. According to Fiorio, "concerning this demographic, epidemiological and social context, healthcare and hospital systems overall must innovate to respond to the new care needs" (Fiorio et al., 2018, p. 4). The evolution of the healthcare ecosystem and the figure of patients (that are more empowered, cantered, and acknowledged) has defined a new healthcare scenario where the most important features are co-creation and personalized healthcare (Dai et al. 2020). The definition of personalized and collaborative experience leads healthcare professionals to cooperate with other

healthcare actors (Frow et al., 2016. Elwyn et al. 2020). As defined by Omachonu and Einspruch (2010), "*healthcare innovation is identified as the leading factor for the introduction of a new concept, idea, service, process, or product aimed at improving treatment, diagnosis, education, prevention and research, and with the long-term goals of improving quality, safety, outcomes, efficiency and save costs*" (Omachonu & Einspruch, 2010, p. 5). The increase in the productivity of services derives from the innovation of services (Stoshikj et al., 2016, p. 3). In the changed healthcare ecosystem, service represents the best way to overcome tough challenges, moving focus from products to solutions, providing better and easier access to care, fostering more active interaction of healthcare actors, and generating efficiency and economy of resources (Ciasullo et al., 2017). The experiential benefit of service innovation has been the main driver of innovation in the healthcare context. The focus on social value, the ability to co-create value, and the growing interaction between all actors, represents a cultural change for the healthcare (Barnett et al., 2011; Erdem & Thompson, 2014, Samuelsson et al. 2020).

The ability to know, explore, cooperate, interact and co-create value with the ecosystem seems to be a way to systematically add value to all ecosystem actors, such as caregivers and patients (Jefferies et al. 2020).

According to Finsterwalder et al.2020, the growing interaction between all actors in the healthcare service ecosystem provides to the progress and promotion of innovation and value co-creation, through coordinated mechanisms active at the operational, social, economic, political, and ethical level.

In the new vision of the healthcare service ecosystem, patients are always more informed and owners of their healthcare journey and caregivers are more focused on value. Value co-creation in service innovation finds in smart technology one of the main enablers. According to Bhattacharya (Bhattacharya et al., 2017, p. 3) noted that "smart technology plays a major role in service innovation and provides transformative opportunities to the services industries."

Innovation in the healthcare field is promoted with a strong focus on as well as technologies. Value is co-created through technology and individuals play a fundamental role in the process of innovation and implementation (Lee et al. 2019). In this view, where technology is the major enabler of service innovation and value co-creation, patients and end-users play an important role in the adoption and

success of innovations, and knowledge is transferred from one actor to another based on a service innovation approach (Secundo et al 2020).

2.2.2 Different perspectives of innovation: Traditional approach vs S-D Logic approach

According to Skålén et al. (2015), a service innovation implies new value propositions that hold promises of value creation for a diverse set of actors. Before commenting on this remarkably important statement, it is interesting to see the innovation process also from a different perspective.

For a long time, scholars have asserted that innovation occurs within the company thanks to the technological opportunities necessary to establish the steps that organizations must follow to successfully place new products on the market (Booz et al., 1982, Cooper, 2001; Garcia and Calantone, 2002). The succession of phases leads to the definition of innovation through linear models. However, these linear models were soon questioned, not only in terms of the "sequential order of the development phases" for which scholars thought about the possibility of organization parallel phases (Clark and Wheelwright, 1995; Ramaswamy, 1996; Alam and Perry, 2002) but also in ontological and epistemological terms (Mele et al., 2017). In this view, the investigated reality is considered stable over time and all phenomena are predictable. According to Mele et al., (2017), the epistemological dimension of linear models provides evidence to support the idea that knowledge is based on information obtained from observable and unbiased experiences. Knowledge is therefore acquired step by step I can. However, the technological revolution has made it necessary to define innovation through an open and collaborative process (Chesbrough, 2003). Pressures due to resource scarcity within a single company and time-to-market make it necessary for companies to tap into a network of partners (Chesbrough, 2006; Enkel et al., 2009). In this vision, the innovative strategies outline the best interaction solution for companies within networks with the possibility of drawing on the partner's technological and sharing potential (Cooper and Kleinschmidt, 2007; Tidd et al., 2005). Thus new models of

innovation are born, characterized by grease (von Hippel, 2005), openness (Chesbrough, 2003), and network (Möller and Rajala, 2007; Tidd et al., 2005).

The main feature of users is the interconnection that allows them to exploit ideas, knowledge, resources, and other elements capable of collaborating to trigger innovative processes within the company (Nambisan, 2002; Nambisan and Nambisan, 2008). The opening of such systems and networking has stressed the importance of knowledge. The ability to innovate of a company and its network is based on knowledge, but it, according to management scholars (Mele et al., 2017) is still considered as an object file to be accumulated, applied, and transferred.

In the S-D logic, innovation is defined as a continuous, effective, systemic process based on complex interactions between actors, activities, and heterogeneous resources in the wider ecosystem of services. It turns out to be a provision of services by actors who integrate resources in new ways of co-creating value. The concepts explained in the previous paragraphs, the A2A interaction, the integration of resources, and the emergence of ecosystems of services generate a new relationship that leads to innovation. In this vision, innovation is about applied knowledge, used both to create resources

and resources by integrating with other resources and by applying these resources to provide the service (Lusch and Vargo, 2014, p. 122). Hence the consideration of innovation as a new value proposition (Michel et al., 2008), or a potential input for the integration of resources in the beneficiary's value creation process. In this context, the beneficiaries also actively participate in the innovative process with the definition of new knowledge or skills to be applied in the exchange service. In other words, innovation is a matter of co-creation of value (Vargo and Lusch, 2004) where the co-innovators (Mele et al., 2014), as integrators of resources in a multiple, constructed and socially integrated (realized (Lusch and Vargo, 2014, p. 121, Akaka and Vargo, 2015). The rationality of linear models is almost completely abandoned and the involvement in networks, collaboration, and interaction only the key elements of value innovation (Lusch and Vargo, 2014).

In summary, innovation is not in inventing new things, but rather in co-creating new innovating in practice and practicing innovation in practice, as well as in

identifying new opportunities for deinstitutionalization and re-institutionalization that provide new solutions (Vargo et al., 2015).

2.3 INNOVATING IN PRACTICES

As it has been defined up to now, innovation occurs when the interaction between actors is generated by a "collective action", it is, therefore, possible to define this process as innovating in practices "(Mele and Russo Spena, 2017). To correctly define Innovation in practices, it is necessary to understand how the actors "learn and discover new ways of integrating resources".

S-D Logic postulates that the customer is always an active actor, which makes interaction and collaborative learning vital (Ballantyne and Varey 2006, Lusch et al. 2010). Despite the importance of the topic and the study of collaborative learning by various authors, such as Edvardsson et al. (2011), the bridge between S-D Logic and learning theories is still quite weak.

From a practice approach perspective, the co-creation of value and the beneficiary's critically important role in the interpretation of value has two implications: (a) it is critical that the provider learns to understand the context of its customers and to support their value-creation processes (Ballantyne and Varey 2008), (b) in carrying out value co-creation and novelty activities, companies can be supported by customers. Thus, according to service scholars, active customer participation can be achieved when firms and their customers invest in an explorative and developmental relationship by interactive and open-ended processes of learning and experimenting together (Ballantyne and Varey 2008, Payne et al. 2008).

As discussed above, S-D logic all opens up new perspectives on the significance of multiple relations and activities in acquiring resources for value co-creation. It is possible to acknowledge that these views inherently approach the idea of learning, i.e., the development of communities and capabilities related to new value co-creation (e.g., John-Steiner 2000; Miettinen 2013).

2.3.1 A practice learning approach to innovation

S-D Logic assumes that the creation of new competencies (skills and knowledge) is of vital importance and focuses on the relationships between multiple actors and "operant resources," for example knowledge and interaction, as well as their application to dynamic processes (Vargo and Akaka 2009, Vargo and Lusch 2008b). Similarly, the learning theories based on sociocultural approaches (Engeström 1999, 2004, 2007, Dewey 1910, Miettinen 2013) -argue that knowledge, skills, and competences are developed in continuous interaction with the social and cultural world. The idea of resources as "becoming" suggests that resources emerge in social action (Vargo and Lusch 2004), and new knowledge created in activities is not only incorporated in new products, processes, and services, but also organizational practices; it is internalized by the people involved in the activity (Lundvall 1992; Ellström 2010). This approach is termed the practice-based learning approach. It looks at knowledge and learning as sociocultural phenomena and reflects on what the implications relate to organizations and their innovation activities.

The study and analysis of the role of learning and practice in the organizations started many years ago (around the 1990s) to reach a common definition and to challenge the consolidated knowledge theory within knowledge management (Nonaka and Takeuchi, 1995). According to Russo Spena et al. (2017), the study of the concepts of learning, practices, and activities, is the starting point that pushes scientists to build approaches to innovation and to criticize traditional innovation research (Russo Spena and Mele, 2012a;).

Knowledge and learning are expressed through practice in 4 ways (as shown in Fig. 2-3):

- cultural interpretation tradition, (Yanow, 2000);
- social learning, (Wenger, 2000);
- historical-cultural activity theory, (Engeström, 2004 and Blackler et al., 2000);
- the sociology of translation, (Gherardi and Nicolini., 2002 and Suchman, 2000).

The categorization of these four activities was done by Nicolini who, in 2003,

strongly argues the value of recognizing the social, contextual, and situated nature of human knowledge and acting. Hence the idea that the practice learning approach contributes to innovation. The latter is realized in practice, it takes place in a daily setting activity and accumulated by daily actions (Katri et al., 2017). Furthermore, given that innovation is a continuous process based on interaction and collaboration (Vargo and Lusch, 2014; Vargo et al., 2015, it takes the form of a collective learning process, aimed at qualitative change and development in practice.

Fig. 2-3: Key learning elements and their contribution

Key elements	Practice-based learning approaches		
	Social and cultural learning perspective	Cultural-historical activity theory	Sociology of translation
Unit of analysis	Practice	Activity systems	Nexus of practices
Learning	Emerges through participation of individuals in the social and material context	Triggered by contradictions and uncertainties in current activity, conscious attempt to expand the object of activity to better meet needs for the future	Is sustained and created in multiple interactions proceeding through collective mediated and coordinated actions.
Focus	Individual in communities or among them; learning is located in a context	Individuals and communities learn in activity systems or between them, and learning belongs to and evolves in a specific space and time	Communities of communities: individual/collective subjectivity within multiple historical and cultural settings
Outcome	Production and reproduction of practice	Reconceived object of activity, novel meaning schemas, tools, activity and practices, as well as reorganized activity systems	New practices in interconnected context; i.e. texture of practices

Key elements	Practice-based learning approaches		
	Social and cultural learning perspective	Cultural-historical activity theory	Sociology of translation
Innovation perspective	Innovation manifests itself through emergent, concrete and relational actions led by attempts to produce and reproduce practices	Innovation refers to a rather radical exploration process of learning something that does not yet exist, and thus it creates new knowledge and new practices for a qualitative transformation of the object and entire activity system	Innovation is conceptualized as a texture of practices that seamlessly interweave social relationships and actions. It is a social emergent process in which a collective doing activates and connects distributed knowledge in and between social groups
Main authors	Brown and Duguid (1991, 2001); Cook and Brown (1999); Orlikowski (2002); Lave and Wenger (1991); Wenger (1998, 2000)	Engeström (1987, 2004, 2007); Engeström et al. (1999); Engeström and Sannino (2010); Blackler et al. (2000); Blackler and Regan (2009); Ellström (2010)	Gherardi (2006, 2008, 2009, 2012b, 2017); Gherardi and Nicolini (2000, 2002, 2011); Nicolini et al. (2003, 2012)

Source: Russo Spena and Mele, 2018

Despite some differences, practice learning approaches contribute to the debate on innovation by clarifying that innovation is achieved in practice, it is implemented in a daily activity setting (Fig. 2-3) and accumulated from daily actions (Katri et al., 2017).

3 LEARNING AND KNOWING

3.1 THE CONCEPT OF LEARNING

Learning theories have traditionally been cognitivist and centered on the individual dimension. With the transition from the individual dimension to the collective dimension and from psychology to the sociology of the organization, a social approach to learning has established itself.

Learning, in its two levels (individual level and at the organizational level), is the subject of study and analysis in many disciplines, such as marketing, psychology, management, and organization, studies (Dahl, et al. 2001, Zundel, 2012, Easterby-Smith 1997, Bapuji and Crossan 2004).
According to the traditional perspective, An organization's ability to learn depends on the experience, ability, and actions of individuals (Argyris and Schon, 1978; Helfat, 1994; Kim, 1993).

In 1998, Gherardi et al., notice the birth of a "silent revolution" that overwhelmed the organizational learning theories. During the revolution, the learning has begun to be an interactive, social, contextual, and cultural process. Thereafter, the expression 'organizational learning' lost its appeal and consensus. Its place was taken by the highly symbolic expression of 'knowledge management', and the articles inspired by thus notion soon outnumbered those devoted to learning. According to Barley and Kunda (2001), this means that the interest is in the processes of interacting, organizing, and changing the activity, not in entities such as organizations.

The discussions among scholars on the subject have meant that, despite the many studies, the concept of organizational learning has remained somewhat mysterious and vague (Lähteenmäki et al. 2001; Gherardi, 2009).

More and more emphasis has been given to the expression "knowledge management", considering the latter as one of the most significant resources of

contemporary society and defining organizational learning as a process to be managed like any other organizational process.

Duncan and Weiss (1979, p. 84) conceive knowledge as the outcome of learning and describe organizational learning “as the process within the organization by which knowledge about action-outcome relationships and the effect of the environment on these relationships is developed”.

The knowledge approach focuses on how individuals interpret or make sense of their knowledge and experience in the social and material world (Brown and Duguid 1991). The main problem, however, was that of understanding the "knowledge" resource.

The "epistemology of possession"[11](Cook and Brown, 1999) considers knowledge an 'object' while the epistemology of practice considers it a collective activity, situated and indistinguishable from working, organizing, and innovating (Brown and Duguid, 1991).

For this reason, scholars have decided to follow analogical reasoning related to the conceptual change from "organization" to "organizing '" (Clegg and Hardy, 1996), which led to the replacement of the concept, with individuals doing and knowing in interaction with others and with the object and activity mediating among subjects (Brown and Duguid 2001). Everything that individuals learn reflects, automatically, the social context in which they learn it and in which they put it into practice (Kallio et al., 2019).

Social practices constrain and guide human knowing and the context of the actions; without social practice, knowing does not exist (Wenger 2000). The definition of a theory based on "knowledge as an activity, and as a collective and distributed doing" sanctions the birth of practice-based studies.

A practice-based approach is particularly suitable to study practices not only in isolation, but as part of interrelated bundles, textures, or nexuses of practices

[11] The epistemology of possession tends to privilege explicit over tacit knowledge, and knowledge possessed by individuals over that possessed by groups (Cook and Brown, 1999)

(Gherardi[12] & Nicolini, 2002; Nicolini, 2009; Schatzki, 2002; Shove et al., 2012). In this view, learning is much more than an incremental knowledge gained from performing ordinary activities; it is a dynamic two-way relationship between individuals and the social and material context in which they participate (Brown and Duguid 1991).

As suggested by Korkman et al. (2010), a practice-based approach can contribute to a deeper understanding of the main mechanisms underlying the value co-creation process, by allowing for a focus on the processual dimensions of usage and consumption rather than on the outcomes of exchanges of goods and services. The dynamic interaction between the agent, knowing, and practices are stressed, it is based on a discursive social behavior, which gives rise to social order.

3.2 THE LEARNING THEORIES

It is interesting to explore the mechanisms of learning in the light of two theories that focus on the creation of new skills, knowledge, social structures, and practices in a cultural-historical context. They are the theories of reflective thought and action (Dewey 1910, 5a) and expansive learning (Engeström 1987, 2004, 2007). The main features are synthesized in Table 3.1.1.

[12] Silvia Gherardi (2008) cuts through the various approaches to address practice-based research as itself a practice in an invaluable guide for organization and management researchers.

Table 3.1.1: The features of learning theories

Approach	Features	Main authors
Theory of Reflective Thought and Action	A habit does not work:  1. Reflection and Question 2. Generation of Hypothesis 3. Mental Experiments 4. Experimental Activity by Experiencing	Dewey 1910, Miettinen 2000
Expansive learning theory:	The focus is on changing and activity and creating something that does not yet exist Contradictions in an activity:  1. Reflection and Question 2. Reconceptualize the Activity 3. Expansion	Engeström 1987, 2004, 2007, Dewey 1910, Paavola et al. 2004

Theory of Reflective Thought and Action: John Dewey (1859–1952), American philosopher and psychologist, in 1910, introduced the idea of reflective thought and action. In his theory he stressed the importance of daily habits and routines, categorizing them as "dominated forms of experience". But when these habits don't work, emerge a problematic and uncertain situation; this requires careful reflection and a broader investigation of the conditions of the situation. According

to Dewey (1910), the relationship and tension between an actor's experiences and his reflections are the fundamental building blocks of the learning process.

Dewey makes a distinction between a primary and secondary experience. The primary experience is composed of material interaction with the physical and social environment. The secondary experience is a reflective experience that makes the environment and its things as objects of reflective and knowledge. It is the failure and uncertainty of the primary experience that gives rise to reflective thought and learning.
The starting point is the observation of reality; however, it is culturally and historically stratified and, therefore, can hinder action in the current situation. It is the failure and uncertainty of the primary experience that gives rise to reflective thought and learning. Only after these observations are made visible and critically transformed by reflection, they can be transformed into enriched means of thought and action (Miettinen 2000).

Expansive learning theory: In the 1980s, Yrjö Engeström defined a new form of learning: expansive learning of cultural patterns of activity that are not yet there, and which therefore involves horizontal or sideways learning and development (Engeström 2001a, b). He built its conceptual framework on Vygotsky's (1978) cultural-historical psychology, Leontief's (1978) activity theory, and ideas of pragmatism and constructivism (Engeström 1987).

Expansive learning theory[13] is not far removed from Dewey's idea and approaches activity as an "environment with historical and contextual origins in which members collectively engage in the construction of social reality" (Engeström 1987). It starts when, during the development of an activity, some actors question the principal goals, patterns, and norms, or also the reasons underlying the activity, and search for new practices.

In his theory, Yrjö Engeström sees the activity as object-oriented and that actions are described through a socio-technical activity system with six related elements. The first three elements describe:

13 The theory of expansive learning provides understanding of the emergence and development of these processes and helps integrate perspectives

- the subject(s) who work(s) with certain
- tools and mediating concepts around
- the object of activity.

The activity takes place in systems with certain

- rules,
- a community
- a division of labor.

A change in activity necessitates a significant change in some or all elements of the system as it indicates that there is a tension in the system of activity.

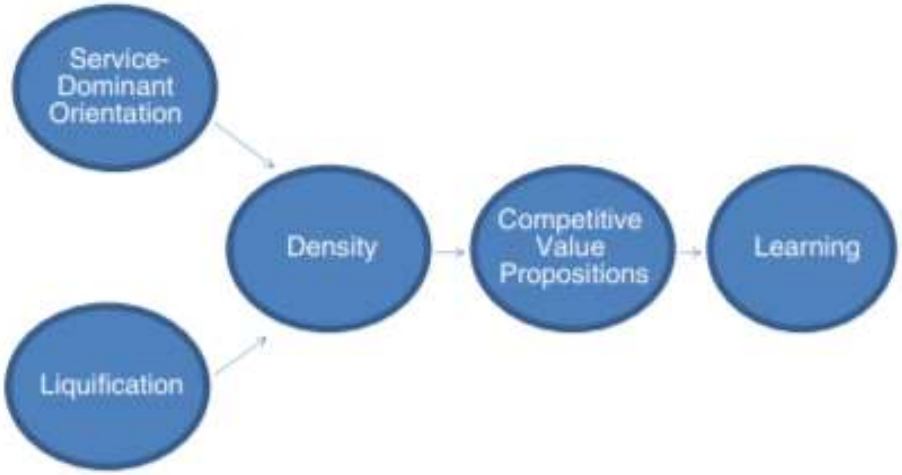
Individuals' and groups' transformative agency is at the core of expansive learning. The effort to change escalates into collaborative envisioning and a deliberate collective change effort at the grassroots level (Engeström 1999, 2001a, b), after which a new motive and expansive cycle follow.

3.3 LINKAGES OF S-D LOGIC TO LEARNING THEORIES

According to S-D logic, the actors have physical and mental skills. They develop and apply these resources and exchange their application with other actors to improve the vitality of the system. This is necessary as physical and mental skills are not evenly distributed among the population. By specializing and improving their skills and abilities, the actors obtain learning and scale effects and the actors derive increasing benefits from exchanging and putting themselves at the service of each other. The service-for-service exchange focuses on the very nature of knowledge and learning. This focus emerges for two reasons: first, in the service-for-service exchange, the interaction between the actors is the predominant element, and the actors who provide the service and those who benefit from the service they get feedback and learn from each other the validity of their respective value propositions (Lusch and Vargo 2006). Secondly, the exchange itself implies the change in the conditions of both actors, because they get something they did not

have, but they give up something they did, consequently, every exchange implies a change (Lusch et al. 2010). Actors expect that there will be an increase in the vitality of the system. Moreover, they do not take action to worsen their condition or to jeopardize their survival. Their hypotheses lead to actions and exchanges that have consequences dependent on experience so that the hypotheses can be falsified. During this process, each actor adjusts their assessment of value phenomenologically and, therefore, the value itself is dynamic. During the service exchange process, the actors learn the exchange value of objects. Learning becomes important, as knowledge of value exchange allows actors to make more informed decisions on the integration of resources and the acquisition or transfer of rights to the service. In a simple barter system, the actor can learn how many units of A are needed for a certain number of units B. However, exchange based on bartering is rather inefficient in terms of learning relative exchange value, as it would need to exchange all the unique combinations of learning the actor's skills and competences to determine the relative economic value of different service offerings. Money becomes a common medium of exchange and allows to compare the reciprocal exchange value of all rights to the service (Lusch and Webster., 2010). When the service-for-service exchange manages to develop in A2A networks, diversity increases instead of decreasing: since it serves the wishes and needs of the beneficiary actors, the variety increases, as the actors are heterogeneous in their desires and needs. This diversity emerges because two actors who specialize in each other's service learn from each other and try to match the offers with the needs and desires of the other beneficiary actor using a common measurement system. When the exchange of service is indirect and takes place through money, the feedback process is quicker and actors learn faster if they need to continue the same way or if they need to be more creative and develop new specialized knowledge and skills. From an organizational perspective, Fig. 3.1, defined by Lusch et al. in 2010, shows a model for defining how organizations can serve by adapting and learning to consistently offer competitive and compelling value propositions.

Fig: 3.1 The learning process in the S-D Logic perspective



Source: Lusch et al., 2010

In summary, organizations increase their chances to serve and thus remain a vital and functioning part of a network of values:

- developing an S - D logic orientation
- separating the information from a physical form: liquefying information resources (Normann 2001).

If done successfully, organizations can create more and new types of densities by reconfiguring internal processes (Normann 2001) based on shape, time, place, and possession of resources and by improving its lighting and enabling processes. The organization then receives feedback as it tests its value proposition on the market.

In a dynamic and rapidly changing world, organizations never learn less but learn more and more (Expansive Learning Theory); they learn which value propositions the customer responds favorably to and learn which ones the customer rejects. The results translate into cash flows but also feedback or learning. So, the starting point is the observation of reality (Theory of Reflective Thought and Action). Following this process, organizations acquire resources and services they need to survive, grow and thrive thereby strengthening the positive learning cycle

3.4 LEARNING AND KNOWING IN PRACTICE

In the learning process described above, the activities of the organization mobilize the knowledge used and usable in organizing. Therefore, according to Gherardi (2011), it is the organizing that enacts subjects (individual, collective, organizational and institutional), objects, and the relations among them around the practices

The practices, therefore, constituted the locus of learning, work, and innovation and these in turn could be conceptualized as practical activities, like a collective bricolage put in place by those who took part in a practice, mobilized resources, used tools and followed a contingent and purpose-oriented rationality.

Many authors who have worked on the notion of the knowledge-learning organization as a process (Gherardi, 2001, 2005, 2009, 2010, 2011, Nicolini et al., 2005, 2011), and as practices (Schatzki, 2001, 2006; Gherardi, 2005, 2011), to the point of defining that organizational learning processes are collective ways of doing, are mobile and unstable, recognizable by learning and knowing. They are established in a heterogeneous network of relationships in multiple forms of spatiality, and can be inscribed and form structures of practices, the conditions of which for the possibility of realization and participation are not given, which also serves as a means to combat, overcome inequalities and to form other actions and practices. Since the processes of knowing are part of the action itself, the notion of learning as a process allows us to understand that learning is not a thing or a means of memorizing something, but a dynamic act intrinsically connected to doing. Doing-knowing-learning is an ontological process indissoluble triad. When the actor takes action, we are awakening and mobilizing knowledge. In acting, the actors are therefore learning, knowing as acting. The processes of learning and knowledge are mutually constitutive of the action, as well as allow the constitution of the actions. The concept of practice is different from the concept of action. The characteristic that differentiates practice from action is its recurrence over time, the history of the practice (Gherardi, 2010). This does not mean that they are antagonists; on the contrary, they are intrinsically connected. In this way, practice

is anchored to action and, consequently, to knowing. When the world is complex, dynamic, and turbulent learning renews knowing to make it relevant to contexts.
In other words, practice-based learning considers social knowing and learning, cultural phenomena that occur through practices. It is a possible way to overcome the existing gaps in organizational learning research, which addresses a perspective of processes such as mental, individualized, segmented, instrumental and which do not consider social relations in their place of analysis (Nicolini et al., 2003; Gherardi, 2005). In these dimensions, knowing occurs through learning that is inherent in doing - a knowable doing - and this knowable doing is supported by the social norms of appreciation of this doing.

3.4.1 Absorptive Capacity (ACAP)

This conceptual rescue of practice-based learning allowed knowledge to be understood as something that people develop collectively, which they do together, being inextricably interwoven with doing. Given the importance of the ability to learn, scholars of management and related disciplines have analyzed this process in detail.

A sort of flashback allows to highlight that, in 1991, Huber divided the learning process into four stages:

- process by which knowledge is obtained: knowledge acquisition
- process by which information from different sources is shared, which, in turn, generate understanding of other information: information distribution
- process by which one or more interpretations necessary for understanding are provided to the information distributed: information interpretation
- knowledge storage tool, which can also be used in the future: organizational memory

Interpreting information means “translating events and developing shared understandings and conceptual schemes” (Daft & Weick, 1984), but there are same problems to face. According to Huber (1991) there is an important element to consider: the information overload. If the number of information to be interpreted

is very high, then the interpretation is less effective, and the learning process is interrupted.

Also, the past experiences play an important role in learning process, but their process interpretation is based on a small number of observations in a complex, changing organization. It is not always clear why an event occurs and how it manifests itself, just as the difference between success and failure is not always clear (Levitt & March, 1988).

Finally, another problem of the learning theories is related to the limit faced by an organization to allow knowledge to flow within the organization itself. Absorption capacity is a limit to the number of information that it is absorb (Levitt & March, 1988, Filippini et al., 2012).

According to Cohen and Levinthal (1990) "the capacity of an organization to absorb external knowledge (recognize, evaluate, assimilate and apply) is a function of the level of prior related knowledge". Therefore, a fundamental prerequisite to be able to increase the level of innovation is to acquire the basic knowledge of a certain subject, because only in this way the external knowledge can be exploited. This implies an investment in "related" knowledge.

The Table 3.1.2 summarizes the definitions and features of ACAP defined by the main authors

Table 3.1.2: The features of ACAP

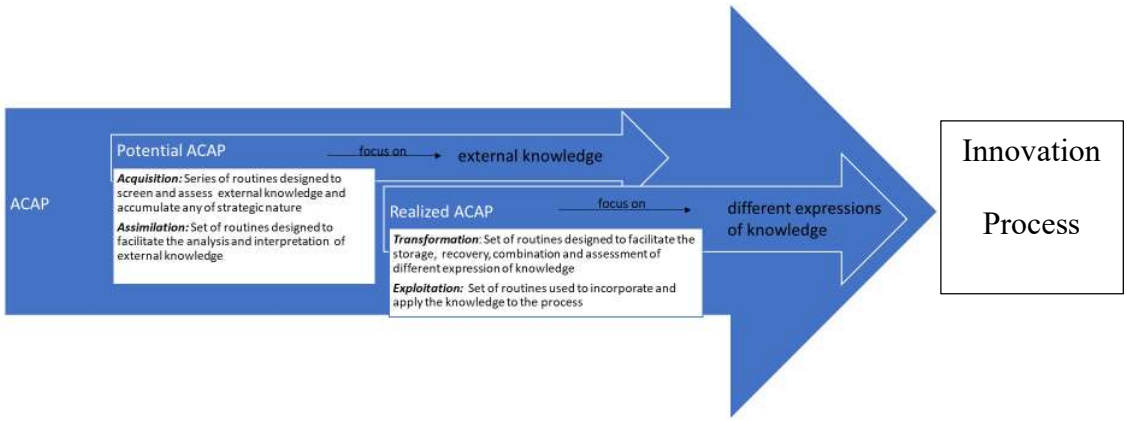
ACAP Definitions	Features	Feature Definitions	Approach	Main authors
ACAP refers to a firm's ability to recognise the value of new, external information, assimilate it and apply it to commercial ends.	Recognition, **Assimilation,** Application	**Assimilation capacity** refers to a firm's capacity to absorb external knowledge. This capacity can also be defined as the processes and routines that allow the new information or knowledge acquired to be analyzed, processed, interpreted, understood, internalized and classified.	Introducing the concept in an organisational context	Cohen and Levinthal (1989, 1990), Szulanski (1996)
Relative ACAP, referring to the ability of a firm to learn from another firm, is contingent on similarities in knowledge bases, organizational structures and compensation practices and dominant logics of both firms	**Acquisition,** dissemination, technical competence	**Acquisition capacity** is a firm's ability to locate, identify, value and acquire external knowledge that is critical to its operations	Introducing the concept of relative ACAP	Lane and Lubatkin (1998), Liao et al. (2003)
ACAP is a dynamic organizational capability encompassing organisational processes and routines, through which companies acquire, assimilate, transform and apply external knowledge.	Recognition, assimilation, **transformation**, exploitation	**Transformation capacity** is a firm's capacity to develop and refine the internal routines that facilitate the transference and combination of previous knowledge with the newly acquired or assimilated knowledge. Transformation may be achieved by adding or eliminating knowledge, or by interpreting and combining existing knowledge in a different, innovative way.	Introducing ACAP as a dynamic capability consisting of four dimensions	Zahra and George (2002), Kogut and Zander (1992), Van den Bosch et al. (1999)
ACAP is a firm's capability to recognise potentially valuable new knowledge through exploratory learning, assimilate valuable new knowledge through transformative learning, and use the assimilated knowledge.	Recognition, assimilation through transformation, **exploitation**	**Application or exploitation capacity** refers to the organizational capacity based on routines that enable firms to incorporate acquired, assimilated and transformed knowledge into their operations and routines not only to refine, perfect, expand and leverage existing routines, processes, competences and knowledge, but also to create new operations, competences, routines, goods and organizational forms.	Introducing a process-based definition of ACAP	Lane, Koka and Pathak (2006)
ACAP is a firm's ability to recognise the value of external knowledge, acquire, assimilate or transform and exploit external knowledge.	**Recognition**, assimilation or transformation, exploitation	**Recognition capacity** refers to ability to define a new component namely, knowledge transformation. it is not the step after knowledge assimilation but represents an alternative process linked to assimilation by multiple paths	Introducing a new conceptualisation of ACAP	Todorva and Durisin (2007)
ACAP is a firm's capability to benefit from external knowledge through exploratory, transformative and exploitative learning processes.	Recognition, assimilation, maintenance, **reactivation,** transmutation, application	**Reactivation capacity** refers to ability to retain knowledge over time to finally reactivate it in appropriate time for innovative outputs	Adding transformative learning to exploratory and exploitative learning processes.	Biedenbach and Müller (2012); Tranekjer and Knudsen (2012)

The features highlighted in the table 3.1.2 (assimilation, acquisition, transformation, application, recognition, reactivation) are related to external knowledge.

Zahra and George (2002) defined the ability to value and acquire external knowledge as a potential absorptive capacity (potential ACAP) and the of leveraging absorbed knowledge as a realized absorptive capacity (realized ACAP). They are closely related, positive results cannot be obtained if the potential ACAP is not supported by the realized ACAP. Potential ACAP abilities the identification of the knowledge that needs to be acquired. It can realize the value, the processes and the routines that make the analysis, processing and understanding of the knowledge that is assimilated (Todorova and Durisin, 2007). Therefore, the capability development is based on potential ACAP (Lindstrom et al., 2013). Realized ACAP abilities the application and exploitation of external knowledge (Zahra and George, 2002; Tu et al., 2006).

As shown in Figure 3-2, potential ACAP and realized ACAP are important ability to support innovation process. The ability to exploit external knowledge is a critical component of innovative capabilities.

Fig. 3-2: Two dimension of ACAP



In summary what can be learned depends on existing knowledge and connection with new sources of knowledge. According to Lanee Lubatkin (1998) “knowledge that is too far removed from the existing knowledge base is easily ignored”.

3.4.2 Orchestration and absorptive capacity (ACAP): a network perspective

Absorption capacity refers to the ability of organizations to innovate, recognize the value of new knowledge, assimilate it and apply it to the co-creation of value (Hunt and Madhavaram, 2012). For innovations to emerge, as a consequence of the activation of a learning process, the development of these skills are required both in organizations and in networks (Klavans and Deeds, 1997; Zahra and George, 2002; Lim, 2009; Peters and Johnston, 2009). This is particularly relevant for service innovation where the need for connectedness is inherent (Hipp and Grupp, 2005).

In networks, the two dimensions defined by Zahra and George (2002), potential ACAP and realized ACAP (can be read in 2.1), are accompanied with relative absorptive capacity (Van den Bosch et al., 1999) that highlights the two-directional approach to learning and knowledge transfer (Peters and Johnston, 2009). According to Zahra and George (2002), potential ACAP is characterized by "a set of organizational routines and processes", where the social integration mechanisms and power relationships influence knowledge. Here the limits to potential ACAP play an important role. The analysis of the obstacles to the ability to absorb external knowledge (embedded knowledge, consolidated skills and traditional managerial cognitions of companies) highlights that both social integration mechanisms and appropriation regimes can inhibit absorption capacities (in particular the recognition and knowledge acquisition) because traditional ways of working and thinking are firmly embedded in the network and therefore blind to participants in the opportunities present (Todorova and Durisin, 2007).

Realized ACAP refers to the ability of the network to make use of the knowledge that has been absorbed (Lane and Lubatkin, 1998; Zahra and George, 2002). It highlights the ability to learn from problems and solve problems (Harrington and Guimaraes, 2005) but often, the knowledge that is too far away from the existing knowledge base is easily ignored (Lane and Lubatkin, 1998). So, the communication and relationship process and organizational routines are important to overcome obstacles (Zahra and George, 2002).

Here orchestration of the network comes into play. According to Ritala et al. (2012, p. 325) *"network orchestration refers to activities that enable and facilitate (but do not dictate) the coordination of the network and the realisation of the innovation outputs. In this context it is not about leading or directing the network, but more a question of discreetly influencing other firms and making sure that the premises for knowledge exchange, value creation and appropriation, and innovation are in place".*

Orchestration is performed by facilitating three areas: knowledge mobility, network stability, and innovation appropriateness (Dhanaraj and Parkhe 2006):

- *knowledge mobility*: the concept of knowledge mobility has been explored since 1994 with Nonaka, it refers to the degree of ease with which knowledge is shared, acquired and deployed within the network (Dhanaraj and Parkhe 2006). Innovation networks can become sources of value when the actors are masters of different knowledge resources, the intersection of which generates innovative propositions (Kogut and Zander, 1996).

In this context the knowledge base is complex and expanding (Powell et al., 1996). According to Moenaert et al. (2000) innovative combinations are possible only if there is an efficient exchange of knowledge. It is needed, therefore, a focalized orchestration.

- *network stability* Kenis and Knoke (2002) claimed that network stability is very important to conducive the value co-creation or value extraction, as lack of cohesion creates challenges (Vander Valk et al., 2010). The stability of the network is favoured by the creation of long-lasting bonds based on strong relationships (Ngo and O'Cass, 2013). Relationships and ties can be multilevel, and, at the base of their creation, there is the orchestration as a "facilitator of collaborations".

- *technological innovation appropriateness:* technological innovation appropriability, in innovation networks, makes enhancing the protection and subsequent exploitation of knowledge and service innovation (Hurmelinna-Laukkanen, 2012; Heiman and Nickerson, 2004). The need for knowledge protection has defined the orchestration activities in this sector with the aim of not hindering the development of trusting and reciprocal relationships.

The aim of making safe interactions and collaborations emerge made it necessary to emerge smart technologies.

3.5 The role of Smart Technologies: theoretical lenses for the artificial intelligence (AI)

Smart technologies exert a direct influence on an knowing and learning abilities by facilitating the transfer of knowledge (Iyengar, Sweeney, & Montealegre, 2015), reducing the efforts needed to identify, assimilate and use new knowledge internally (Carlo, Lyytinen, & Rose, 2012).

The field of AI research is defined as the study of "intelligent/cognitive agents," that imply the analysis of any device able to perceive the environment and take actions that maximize the chance of success to obtain at some goal (Marr, 1977). According to Spohrer and Banavar (2015) cognitive technologies rely on computational components that deliver cognition as a service through three Ls: language, learning, and levels. They can empower and scale human expertise (Kelly, 2015) transforming how actors interact with machines, performing automatic tasks, and accomplishing objectives that traditionally required human labor. In other words, technologies as AI, text mining, Internet of Things (IoT), digital media, virtual reality (VR) and augmented reality (AR) augment human intelligence and capabilities across the spectra of sensory perception, deduction, reasoning, learning, and knowledge and change the actors' experience significantly (Belk, 2013; Čaić et al., 2018; van Doorn et al., 2017; Huang and Rust, 2018; Kunz et al., 2017; Wirtz et al., 2019). The application of AI interfaces or devices effectively enables and augment actors' interactions and relationships (Subramanian et al., 2019; Porter and Heppelman, 2014; van Alstyne et al., 2016). Furthermore, AI offers promising ways for actors to innovate (Demirkan et al., 2015; Ng and Wakenshaw, 2017), due to their capacity to increase their knowledge, generating information by automatic analysis of structured and unstructured data. In service research, technologies promise broader applications for augmented human-machine interactions (Huang and Rust, 2018; Wirtz et al., 2018) by not only transforming data into usable intelligence but also incorporating digitally empowered systems into human lives (Demirkan et al., 2015). AI is used to integrate and augment human capabilities, not replace them, with the result to

enable a summative and emergent resource-integration processes (Mele et al., 2018).

Although many disciplines have analyzed the topic of intelligent technologies defining their fundamental importance both for business scholars and professionals (Lemon and Verhoef, 2016), there appears to be a lack of comprehensive approaches that explain the phenomenon and its consequences form an ecosystemic perspective. According to Schwab, (2017) most of the studies focus on the exploitation of AI and machine learning from a technological perspective and the current understanding of the impact of AI on the value co-creation in ecosystemic perspective of service remains fragmented and under-researched.

Therefore, it is important to base theoretical discussion on two complementary streams of literature, since combining lenses brings major benefits in terms of new insights and novel hypotheses (Okhuysen & Bonardi, 2011) to analyze how smart technologies might fundamentally transform the knowledge acquisition process, behaviors and experience of service actors. The ongoing discussion in the management and service journals regarding technology-enabled service innovation and value co-creation, consider the growing literature on value creation in service ecosystems through a practice-based approach, which reflects the growing appreciation of new way to expand learning actions, interactions and engage actors, through actions that prompt resource access and support the generation and dissemination of knowledge. As suggested by Korkman et al. (2010), a practice-based approach can contribute to a deeper understanding of the main mechanisms underlying the value co-creation process, by allowing for a focus on the processual dimensions of usage and consumption rather than on the outcomes of exchanges of goods and services.

These perspectives enable to the emergence of the importance of roles of AI in value networks, according to their value co-creating potential, in the developing theory on future service technologies ' influence on innovation in different contexts, such as in the healthcare field.

3.5.1 Technology-enabled value co-creation and service innovation

Innovation is seen as a persuasive avenue for organizations to create value and competitive advantage (Pitelis 2009). The study of innovation is no longer

synonymous with a sole focus on new product innovations (Sawhney et al. 2006). Despite serious concerns about to identify the key drivers of successful service innovation (Droege et al., 2009), the service innovation concept has been developed and applied in multiple ways both scientifically and in practice. The opportunities of new technological to improve the ability to co-create service with users, ,such as those incorporated in the AI recently has allowed to claim that digitization of information on a large scale and digital infrastructures that collect, process, distribute and use this information are allowing radically new (re) combinations of digital and physical components to produce new products and services (Yoo et al. 2010). Following Agarwal and Selen (2011), service innovation is defined as a consequence of a process of value co-creation capable of offering organizations greater opportunities and ability to make high service offers. Based on this intuition Akaka and Vargo, (2014) affirmed that smart technology is a means of innovation as well as an outcome of innovation and, contributes to value co-creation by enabling the sharing of information within and across service systems. In other words, the value co-creation is facilitated by smart technologies (Kaartemo and Helkkula, 2018).

Smart technologies including virtual communities, hospital web portals, blogs and "apps" provide a channel to enhance value co-creation in healthcare (Carida` et al., 2013). These technologies help to augment human intelligence and capabilities across the spectrum of sensory perception, deduction, reasoning, learning and knowledge (Kelly, 2015), but, at same time, their role in service innovation depends on the heterogeneity of actors and shared resources, and the intention of the organization to standardize transactions (Frey et al., 2017).

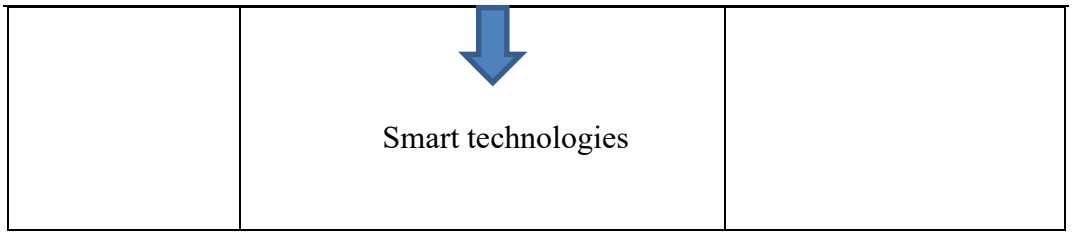
The impact of digital technologies on value co-creation processes allows the evolution of social arrangements and institutional structures (Mele and McDavid, 2018). Pinho et al. (2014) link technologies and value co-creation factors including the availability, accessibility and reliability of information and actor's collaboration and communication which lead to better decision support management.

Furthermore, advances in technology substantially transformed service systems and these technology-driven advances also need to be taken into consideration when attempting to explore value co-creation (Edvardsson et al., 2010).

The table 3.1.3 shows three different approach (technology-driven approach, knowledge-driven approach and social approach) based on a link between value co-creation and smart technologies:

Table 3.1.3: Value co-creation and the role of smart technologies: three different approach

Approach	**Features**	**Main authors**
Technology-driven approach	Technologies are considered as the main levers to enable co-creation. Smart technologies  Value co-creation	Neuhofer et al., 2012; Breidbach and Brodie, 2017, Jiménez-Barreto, and Martínez, 2018, Beirão et al., 2017
Knowledge-driven approach	Technologies are viewed as a context-dependent variable that should be negotiated necessarily through human interactions and resource integration to produce value co-creation (Sigala, 2015). Human knowledge- interaction  Smart technologies  Value co-creation	Sigala, 2015, Cabiddu et al., 2013, Goh et al. 2016, Barile et al., 2017
Social approach	Experience and other social and contextual variables (such as: power relations, ideology and views) shape value co-creation (Kelly et al., 2017). Social dimension context  Value co-creation	Kelly et al., 2017, Hunter et al., 2015, Edvardsson et al. 2011, Edvardsson et al.,2010



- technology-driven approach: Combinations of knowledge, technology and institutions across the provider and user service systems provide value creating mechanisms in service innovation (Srivastava and Shainesh, 2015). Technologies are considered as the main levers to enable co-creation and smart technologies are views as the key antecedents of value co-creation (Neuhofer et al., 2012; Breidbach and Brodie, 2017).They extend the boundaries of service interactions making new opportunities and challenges arise. Services ecosystem requires full collaboration between the different actors (Beirão et al., 2017, Apesoa-Varano et al., 2011), it can be facilitated by technology.

  In this view, co-creation practices are enabled from the use of technologies that augments the strength and effectiveness of relationships between actors (Jiménez-Barreto, and Martínez, 2018). In addition, the characteristics of smart technologies such as transparency, accessibility, sharing, effectiveness and adaptability (Nenonen et al., 2012; Ramaswamy and Gouillart, 2010) provide the ability to make and to exchange resources anytime and anywhere (Ostrom et al., 2010). The exchange and use of resources during value co-creation is understood to occur without constraints in SD-logic (Vargo et al., 2010).

- knowledge-driven approach: according to Osei-Frimpong et al. (2016), smart technologies enable 'access to information and knowledge acquisition, which empowers patients to actively participate in clinical encounters, understand the service orientation, and suggest options in relation to the treatment plan'. In this context co-creation practices are seen as the essential drivers to use technology efficiently and smart technologies are viewed as a context-dependent variable that should be negotiated necessarily through human interactions and resource integration to produce value co-creation (Sigala, 2015).

  Digital tools are important elements that fosters the attainment of

competitive advantage indirectly (Cabiddu et al., 2013) and their use does not imply the automatic co-creation of value. In the healthcare context, a digital tool enables the automatic transfer of actor's data and information (Esmaeilzadeh and Sambasivan, 2016). In this way, smart technologies become an important element to supports coordination and continuity of actions (Kooij et al.,2017).

In other words, they enable actors to seek information to get knowledge, reduce uncertainties, understand and control co-creation environments (Osei-Frimpong et al., 2016). According to Goh et al. (2016) digital technologies enable the sharing of knowledge and experiences among actors and organization

- social approach: Giddens (1984, p. 2) suggests that all activities, including value co-creation, take place within social systems and that individuals have the potential to learn, adapt, and make choices based on their perceptions of their socially constructed world. Based on this evidence, Edvardsson et al. (2011) have introduced a social constructionist approach to value co-creation by locating value co-creation firmly within a social context. Experience and other social and contextual variables (such as: power relations, ideology and views) shape value co-creation (Kelly et al., 2017). In a social context the variables described above influence and are influenced by an effective use of smart technology (Hunter et al., 2015) with direct impacts business growth, competitive advantages and innovation. Therefore, value co-creation is shaped by social forces, is reproduced in social structures, and can be asymmetric for the actors involved (Edvardsson et al.,2010).

Smart technologies support actor network collaboration through information portals that bring together and enable them to access resources such as literature experience, and personal data, enabling sharing of knowledge and experiences among actors, hence co-create value (Caridà et al., 2014).

The social dimension has a dual interpretation: it can act as an engine of value co-creation, but, at the same time, it can be the result of co-created value exchanges with socio-innovative impacts on society.

In their review of relevant literature, Randhawa and Scerri (2015) identify the need to measure relational capital that drives network collaboration as a key lead indicator of service innovation. A key motivation is the evolvement of service innovation into a vast field encompassing the study of intangible processes and dynamic interactions among technological and human systems. One group of studies highlight the benefit to organization that are able to employ the dynamic capabilities necessary to take advantage form information making by intelligent things (Russo Spena and Mele, 2019). Within organizations, intelligent things may complement the capabilities of actors thereby enhancing the overall ability of the organization to efficiently and effectively operate, particularly if the service technology helps people to optimize time in performing tasks and achieving better goals (Marinova, de Ruyter, Huang, Meuter, & Challagalla, 2017) such as take care of own health daily from home. Service scholars posit that the type of digital data available in the AI offers rich new opportunities for enhancing the actor engagement whereby a "superadditive" effect can boost the data's value when it is used by organizations (Van Doorn et al 2010); having more data and information makes having a actor engagement more valuable, and vice versa.

However, to what extent these potential advantages can be realized is some actors, for example elderly people and their value networks of formal and informal caregivers, have exhibited some reluctance to accept intelligent technologies (Broadbent et al., 2009; International Federation of Robotics, 2015); this reluctance is a key challenge for service innovators in this and other fields where technology enables value networks (Caic et al 2018). Indeed, service technologies make many new challenges to the organization models, not least the difficulties of adapting existing, and often historically successful, service system models to new digital possibilities.

Service innovation studies are increasingly acknowledging how a organization's activities are interdependent with its actors daily interaction whereby the process of value creation is boundary-spanning (Breidbach and Maglio, 2016; Lusch and Nambisan, 2015)..

When piece of information can flow from a A2A in a indirectly way, resulting new the value proposition making buy automated actors, such as socially assistive

robots that offer assistive value propositions. This leads to the potential fracturing of in connecting service system model (Thambusamy and Palvia,2020). Thus, service technology inherently lends itself to cross-border innovations, challenging organizations models from previously unconnected actors to define knowing together. Grisot et al. (2014) argued that making structures flexible, which can evolve over time and context to accommodate specific users' needs, can facilitate future innovation. It removes traditional physical space, and intensifies collaboration. The digital infrastructures enable the generativity of the digital platform upon which many organizations are able to innovate (Cusumano 2012; Gawer and Cusumano 2008; Yoo et al. 2012; Zittrain 2006). Together, these challenges are forcing organization models to redesign their value propositions and their long-term strategies, in other words the who (targeted customer group), the what (value proposition), the how (activities and capabilities used to create the value proposition), and the value (explicit explanations of how profit is made, including costs and revenues) (Gassmann et al. 2014).

If there is the attempt to assess the extent to which this literature can be applied AI, then it is possible conclude that theory development for knowing system models is needed (O'Brien Pallas et al., 2010). There is a paucity of theoretical argumentation, especially with respect to an explanation of the consequences of intelligent things for service system models.

Despite the many efforts in 2017 Barile et al. affirm that the nature of the relationship between smart technologies and value co-creation is not clarified (Barile et al., 2017).

The extant literature doesn't address the effects of pervasive learning on organization' knowing strategies management. The levels of learning being brought about by the AI does not simply offer learning activities from smart things (for example smart watch) and service applications but enables wholly new forms of learning embedded in network constituents due to the interconnection between data streams from both social and physical systems and sources. A major challenge associated with such a shift is how organization develop their existing strategies model towards a new "knowing system model" that fits best in the AI context. This implies that the development of a new knowing system model has to deal with path dependency effects as the organization attempts to extend its current strategy and

value propositions step-by-step in the direction of the new AI context (Wirtz et al., 2018). Any new theorizing must be able to guide the creation of new "knowing ecosystem model".

3.5.2 A knowing management framework: AI as enabling Technologies

When the perspectives of service ecosystems is combined to the AI, the advancement of the intelligent technology seems key to the understanding of its consequences. Flow of data from one actor to the other in through intelligent things also make flows of information between multiple parties connected, therewith the impact on the reach and richness of the service ecosystem. As Maglio et al. (2006, p. 83) observe, "the challenge lies not simply in formally modelling the technology or organizational interactions, but in modelling the people and their roles as knowledge workers in the system". A useful frame for the study of AI technologies borns from combining the use of technology-enabled service innovation with a service ecosystems perspective in the S-D logic. It presents an opportunity to 'zoom out' and broaden the perspective (Vargo & Lusch, 2016). Of great importance is the understanding of AI provided by these combined perspectives, from AI application to service and social robot, to better analyze its impact on the complex service ecosystem and the ways in which individuals and organizations co-create value. Such a frame also provides an understanding of evolution of interactions between different actors in the service e system, such as when social robot, which may be used by a elderly people, connect with intelligent things connected with doctor and caregivers. Although these two theoretical lenses differ in focus; the first centered on service ecosystems and the second on technology-enabled service system model, it is important to consider their conceptual distance as low and the compatibility of their conceptual assumptions as high (Okhuysen & Bonardi, 2011). Both lenses emerged within service disciplines and focus on the complexity of value, together with the disruptive nature of AI in services, that creates unique challenges to existing service processes.

While most literature in service traditionally focuses on the potential impacts of AI in different field without a framework for understanding the emerging role of AI and how integrate its within complex service systems through appropriate combinations of behavioral, affective and cognitive resources.

For example, embedding human capabilities in social robot, users likely activate social perceptions and evaluate the robot according to the warmth and competence dimensions of social cognition, with direct impact on service ecosystems. The warmth of technological actors is signaled through their affective resources and their competence through their cognitive resource (Čaić., M. et al. 2019) .

A service ecosystem worldview, as suggested by these two theoretical lenses that describe value creation occurring across learning systems based on cognitive resource, through the flow of information between different actors in different place, can provide insights into this new phenomenon and, as such, bring insights into how the AI could change service system model.

Summing up, the AI has the potential to radically alter current the view of the service context and the configuration of existing actors, where the combined perspectives of the technology-enabled service innovation and the service ecosystems view is a useful and appropriate theoretical lens to conceptualize these changes. The extent to which the service innovation in different context will evolve is based on notably the level of learning that objects possess. However, there is a lack of theory on this important characteristic of ways in which practices are changing for the actors in service ecosystems impacted by AI.

According to scholars alike, the world are experiencing the fourth Industrial Revolution, characterized by new technologies (e.g., AI, robots, Internet of Things, machine learning) that radically change the ways in which and with whom actors co-create value (e.g., KPMG, 2017, Schwab, 2017). It is important to highlight five areas of technical development and specify how they relate to the notion of intelligence: analytic AI (Paschen, et al. 2020), functional AI(Brill, T., 2019), interactive AI (Gill, S. P. 2008), text AI (Lee et al. 2020)and visual AI (Zhang, et al. 2019).

First, the emergence of things, able to scan tons of data for dependencies and patterns to ultimately produce recommendations or provide actors with insights (analytic AI), thus contributing to data-driven decision-making,has opened up new opportunities for increasing the level of intelligent things (Paschen, U., et al. 2020). One of the key aspects for AI is its ability to (re)elaborate data and to learn from past experience in order to act accordingly. Analytic resources allows for an

increase in the specialization of smart components and the ability to make information. This specialization in the constituents of the AI is useful for the process of minimizing risk in the healthcare field (for example the analysis of the data coming from a smartwatch allows to avoid the risk of collapse). An example of analytic AI is IBM Watson Analytics. Watson Analytics is a smart data discovery solution available on the cloud. It guides data exploration, automates predictive analytics and enables effortless dashboard and infographic creation. It is possible to find answers and new insights to make confident decisions in minutes.

Second, functional AI is a key enabling technological development driving it scans huge amounts of data and searches for patterns and dependencies in it. However, instead of giving recommendations, functional AI takes actions. For instance, being the part of the IoT cloud, it can spot a smartwatch-breakdown pattern in the sensor data received from smart watch and trigger a command to change this smartwatch off. Technological advancement has proceeded in three directions: enhancing the quality of sensing resulting in higher data quantities, improving algorithms to interpret the massive amounts of sensing data (Langely, et al., 2020) and managing future activities. The amount of continuously scanned data and searched for patterns and dependencies has allowed researchers to use statistical methods that were previously considered to be of lesser importance as, due to the lack of data, they often resulted in overfitted models, as was the case with multilayered neural networks (Hippert, Pedreira, & Souza, 2001). The conceptualization of functional AI proposes that intelligent technologies in services must function fully autonomously to reach the full potential of cognitive value propositions (Caic et al., 2018).

Third, the foundations of AI has been long been studied in the context of theoretical "interactive AI", where smart things are understood as objects that are able to automate communication without compromising on sensing, reasoning, and performing actions based on the input data to obtain a certain information. The Intelligence of things in this case implies autonomous behavior, and often involves various algorithms. Research on interactivity employs advanced financial/organizational methods both to improve cross-activating opportunities and revenues but also to consider how smart agents learn through interaction and to define how various actions contribute to the achievement of the desired

objectives (Leonetti, Iocchi, & Stone, 2016). Four, the importance of "text AI" – the ability AI device to recognition, speech-to-text conversion, (Lee et al. 2020) machine translation, and content generation capabilities – was clearly understood from the early beginnings of the AI, and was further developed after the success of Natural language processing (NLP) including applications such as speech recognition, text analysis, translation and other goals related to language (Davenport and Kalakota, 2019). In healthcare, the dominant applications of text AI involve the creation, understanding and classification of clinical documentation and published research. Text AI systems are able to analyse unstructured healthcare information on patients, prepare reports (eg on radiology examinations), transcribe patient interactions and conduct conversational AI (Davenport and Kalakota, 2019). Finally, with "visual AI", it is possible identify, recognize, classify and sort objects or convert images and videos into insights. Visual AI uses deep learning algorithms to analyze images related to scenes, objects, faces and other contents. This type of AI covers computer vision or augmented reality fields. For example, Watson Visual Recognition service is a AI model improved with broader training data sets, advances in neural network learning techniques, and finer tuned algorithms. Based on a set of such improvements, Watson Visual recognizes gender and skin tone with up to 10 times decrease in error-rates.

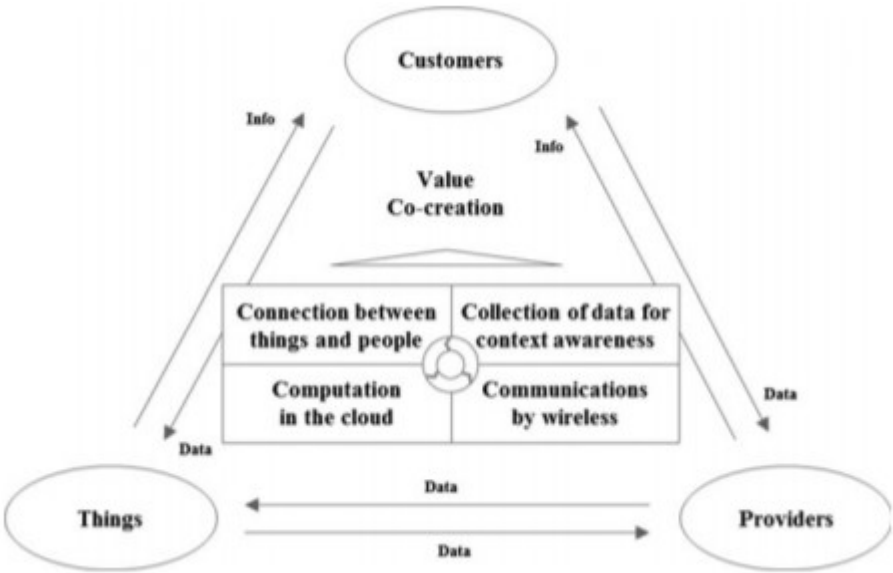
3.6 Linkages from Learning & Knowing, Smart Technologies to Service

The first axiom of S-D logic, Service-for-service exchange, is intrinsically focused on learning and knowledge discovery. Here the interaction between actors plays a predominant role because it allows to obtain actors who provide and benefit from the information service (feedback), therefore, to learn from each other. Furthermore, with the exchange between services the actors get something they didn't have by giving up something they had; they change their condition to the discovery of knowledge.

Smart technologies facilitate the learning and knowledge transfer mechanisms just described. The presence of smart technologies in service systems leads to define the so-called smart service system. A smart service system is a service system capable of learning, knowledge transfer , dynamic adaptation, and decision making (Medina-Borja 2015) that requires an intelligent object (Allmendinger and Lombreglia 2005, Wünderlich et al. 2015) and involves intensive data and information interactions among people and organizations (Maglio and Lim 2016, Lim et al. 2018a). A common theme among these innovations and improvements to services is the need for iterative learning and adaptation as an individual actor's service experience unfolds. In this perspective, Smart service systems incorporate smart technologies for sensing, connecting, communication, control, and storage to effectively and efficiently consider the needs and context of actors (Lim et al. 2016).

By reviewing the scarce literature on the smart service and smart technologies, Lim and and Maglio (2018) proposed a conceptual framework of smart service system – as shown in Figure 3-3.

Fig. 3-3 A conceptual framework of smart service system



Source: Lim and and Maglio (2018)

The authors show the connection between actors and things. Actors are connected to each other co-create value through knowledge transfer. Data are collected from

smart things, customers, and providers and then transformed into information through computational processes. Knowledge generated from computational processes is used by the actors to use, manage, and improve their concerned things and people. The connection between things and actors and learning from interaction are the basic attribute that a smart service system should manage.

4 RESULTS AND CONCLUSIONS

4.1 Findings and analysis

IBM Watson is a primary cognitive computing technology platform whose features are the analysis of high volumes of healthcare data, understanding of complex questions posed in natural language, and proposal of evidence-based answers. Watson continuously learns, gaining in value and knowledge over time, from previous interactions. It can collect and manage large amounts of data.

Four main interconnected practices - dialoguing, understanding, creating and enabling-emerge.

***D**ialoguing*

Dialoguing is prompt differently thanks to IBM Watson health. Thanks to connectivity of Health solutions actors can start a conversation with colleagues, caregivers and other actors. The cognitive technology re-formulates the medical language into easier to understand, actor-friendly wording. At the same time, dialoguing enables access to locate, identify, value, and acquire external knowledge that is critical to information. Actors have easier access to information; it is essential to improve the "stimulation the generation of new ideas"
Users as well as doctors can get data and information from dialoguing and thus acquire and increase knowledge about an issue. The health technological solutions offer the opportunity for actors to improve health status based on emerging personal data and information and knowledge acquisition.

"*Sugar.IQ App makes active people. The direct dialogue with more doctors, with family and other people, let the acquisition of information. People feel protected everywhere at any time because they know that that can ask info to more experienced people or doctor. It helps Sugar.IQ to acquire information and improve their ability to understand and to diagnose the problem" (source: Sugar.IQ CEO*)

"Medtronic organization can get data and it can study every information about diabetes. Medtronic diabetes collects data about temperature, the level of sugar, frequency of heart, and actors can have a dialogue about this information with patients or relatives. In this way Medtronic acquires knowledge about future activites" (source: the CEO of Medtronic)

SmartAnalyst has created a cognitive dialoguing system that provides personalized healthcare conversation based on sensor data. The accessories are made of sensors and, thanks to a small uploader, the data acquire by the pump are sent every five minutes via Bluetooth to the application installed on the smartphone. The cognitive dialoguing assistant sends a message to the patient's providers of healthcare, connects to the nearest medical center and suggests specific food- or therapy-related actions and event (source: the CEO of SmartAnalyst)

***U**nderstanding*

Smart technologies enable healthcare organizations, patients, their families and doctors to monitor, track, and share with other actors timely and safety information, thereby overcoming the physical constraints of time and space. Through sharing it is possible to understand more and more information.

Healthcare data, languages, processes, metrics, are the principal source of understanding by Watson technology. Through understanding, IBM Watson contributes to assimilation of knowledge.

IBM Watson Health is used to understanding useful information hidden in data and / or documents. Different empowered treatment activities are performed through the understanding of information shared between doctors, different patient groups, caregivers and other actors. The combination of Watson Health with health data

provides virtual coaches for healthcare organization, able to track and monitor physiological data of their patients, both in real time, through the app, and via USB on the computer to predict outcomes, suggest treatment plans and give targeted encouragement during the recovery process. IBM Watson in apps and wearable devices allows health monitoring and secure data understanding with electronic medical records. The technology is suitable for assimilation knowledge in many situations, from laboratory settings to at-home analysis.

"*When blood pressure of a patient is too high and the data point to worrying healthy situations, such as heartbreaks, the app generates a direct video with the doctor and to understand the problem".* (source: Chairman of Promedica)

Smart technologies abilities healthcare organizations to absorb external knowledge and they allow the new healthcare information or knowledge acquired to be analyzed, processed, interpreted, understood, internalized and classified (assimilation of knowledge).

C*reating*

The new intelligent technology enables healthcare organizations, doctors, patients, and other actors to learn about healthcare data, creating new information and new decision-making ways, thereby overcoming the cognitive constraints such as those related to lack of knowledge. Through Watson's cognitive capabilities, healthcare organizations can assimilate and acquire information in a different way by increasing their ability to create knowledge and improve life conditions. IBM Watson Health allows the creation of knowledge. Transformation may be achieved by adding or eliminating own knowledge, or by interpreting and combining existing knowledge in a different, innovative way. The "smart creation" of knowledge allows a quick adaptation to new situations.

"The virtual coach allows J&J to create information to the assessment of patient's seizures providing evidence to clinical decision making and assisting doctors, families, and caregivers in objectively monitoring and improving the progress of the recovery and the efficacy of the therapy." (says: IT specialist of J&J app).

At the same time, doctors learn as much as possible from the patient through free access to "intelligent creation" of information and better prevent disease and improve treatment. Direct transformation of one's knowledge through intelligent technologies with the implementation of IBM Watson, allows the physician to detect abnormal health situations and to quickly alert on the status of patients, know the event and decide how to intervene.

"I love this cognitive hospital app, it is my support to know and act in time! I love to monitor children's vital signs. Managing a child's allergic crisis is very difficult, but this app has helped me, and my colleagues, to detect health parameters and transform the collected data into new information Creating information on the health status is important in preventing a crisis ``(says: CEO and Doctor of a Alder Hey Children's NHS Foundation Trust)

By creating information, assumptions, and knowledge, the cognitive technology enables actors to learn together and improve their ability of self-supported learning and data-based predictive. Through technologies actors can defer and dismiss decisions, explore alternative choices, integrate new information and seek new congruence in the decision-making. This expands the learning of the actors and provides opportunities for ongoing improvements in the health.

***E**nabling*

IBM Watson health enables healthcare organizations to incorporate knowledge acquired, assimilated and transformed during their operations and activities to not only refine, refine, expand and leverage existing routines, processes, skills and knowledge, but also to define new operations, skills and routines. Smart technology enables actors in the organization share the same specialized language, so they will be effective in communicating with one another, at the same time enables them to tap into diverse external knowledge sources. "Smart" Communication and interaction between individuals with diverse knowledge enable the group to achieve something beyond what anyone individual can achieve.

"In a difficult time of lack of personnel, it was possible to collaborate and achieve the same objectives. The enabling of subjects "made suitable" thanks to the application of knowledge throughout the organization has made great satisfaction. IBM Watson enables to act" (says: R&D manager of Cooperativa Sole)

Managing the uncertainties of information and providing a more specialized context with the application of knowledge is an additional theme for advanced health. Smart technology enables actors in seeking an inclusive viewpoint, valuing and accommodating conflicts, revealing assumptions, and discrepancies with the application of knowledge. These generate more informed relationships, actions and meanings and, consequently, a safety healthcare process. It emerges as clear that the quality of health information and interactions lower the sense of risk.

"Using IBM Watson Health enables a win-win situation for my patients and me as a care manager. It saves me time and gives me the capabilities to reach out to more patients. It helps me to determine how my patients are doing with managing their chronic disease. Most importantly, patients don't fall through the cracks like they might have in the past with our manual processes. Actor throughout our community get the continual follow-up they need." (says: Manager office of Catalan Institute of Health).

4.2 Discussion

This study conceives the impact of smart technology based on IBM Watson on knowledge-based skills (ACAP) and how it affects value co-creation practices, in a service ecosystem perspective. The theoretical and empirical analysis allows developing a comprehensive framework based on ACAP elements, service innovation, practice, and value co-creation.

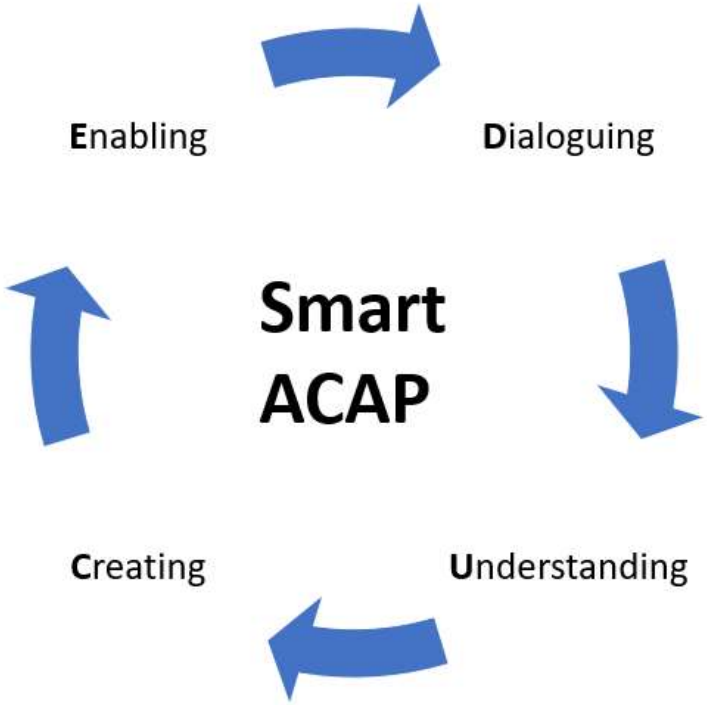
More in detail, to answer the research question (RQ) 1, the study aimed at unpacking characteristics of ACAP and lick them to smart technologies. The findings have shown that the impact of technological innovation on the knowing and learning process has involved a range of actors, thus going beyond the dyadic firm-customer relationships and requiring a broader approach to grasp the complexity of the phenomenon. The elements of ACAP (acquisition, assimilation, transformation, application) have undergone such technological and ecosystemic

influence. The main contribution is in addressing how smart technologies supporting dialoguing, understanding, creating and enabling new "informed ways" to do things, with the goal to serve each other better and co-create value through AI.

In a digital world, ACAP represents a huge challenge to the healthcare system because increasing data also means having a larger number of information and knowledge to the manger. To ensure the quality of healthcare in step with digitalization, new technologies emerge as enablers of services in health systems. The new digital services supported by IBM Watson Health innovate data and information management improves the ability to assimilate, acquire, transform, and apply knowledge. IBM Watson allows you to overcome the separation between informed healthcare professionals and not informed to promote connections in actions that involve multiple co-creators. This opportunity is based on the possibility of applying the knowledge, formed thanks to the support of technology; knowledge of meaningful information on people's health, and transforming the role of actors by bridging distances and constraints and helping to balance data and knowledge gaps.

ACAP supported by intelligent technology is defined as "smart" absorptive capacity. Smart ACAP supported by Watson technology included in digital health applications, products, and operations influences co-creating value practices, providing access to data-driven insights that improve health services and create value. Ongoing diagnosis systems and an intelligent cloud for real-time connections and health data analysis are the key drivers of this development. Hence, to answer the Research Question (RQ) 2, the impact of smart ACAP on value co-creation practice can be analysed through the practice lens. The different elements of ACAP influenced by smart technology, are embedded in the co-creation practices that emerge over time due to actors' collaboration and co-creation. A model of co-creation practices in the healthcare field is presented in figure 4-1

Fig.4-1: A model of co-creation practices



Dialoguing practices are established among interacting actors (doctors, and other actors) to communicate on what is going and to get a clearer picture of what is there within certain parameters. Trough the support of AI, actors also interact by understanding the information and it optimizes interactions and transparency. Understanding prompts digitally connected actors also to assimilate new data, that, rielaborated by smart technologies, creating information and knowledge and focuses on solid monitoring and creating actions; at the same time, creating generated by the data processing and new knowledge, represents the basis to enabling the application of new knowledge in to the wider arrangements involving multiple actors, data, information, meaning and values. Informed, connected, empowered, and active actors are put in a connected ecosystem of service providers and other actors. Active actor can use their data, knowledge and experience to make a valuable contribution to service provision.

In conclusion, this study offers main contributions to on-going discussions on how smart technologies affect ACAP, in that it frames the ways these technologies enact smart ACAP to contribute to value co-creation. The concept of smart ACAP accounts for recent developments in smart technologies; it is defined as the influence of smart technologies on the capacity of actor/organization's to recognize potentially valuable new knowledge through exploratory learning, assimilate valuable new knowledge through transformative learning, and use the assimilated knowledge, without excluding options or significantly changing their economic incentives. Smart ACAP enables actors to make better decisions by providing knowledge resources that would otherwise not be available, extending ways to construct information that otherwise are not available, and augmenting humans' ability to use the insights from this knowledge.

The analysis identifies practices prompted by smart technologies. I address smart ACAP as AI-mediated capabilities that contribute to overcoming actor's cognitive and intuitive limitations when they perform actions that contribute to value co-creation. By promoting knowledge automatism, smart ACAP help actors continuously monitor, update, and refine their decisions and execution to better management of activities.

Smart ACAP influence value co-creation in supported relationships that are nonlinear and indirect. The personification of practical understanding and skill shapes and gives consistency and continuity to the relationships between the actors. The relational character of the practices favors the collective dynamics of social processes. AI supports the configuration of new knowledge that influence human activities by providing a guide to decisions and actions that improve value co-creation. By moulding the actor's understanding of surrounding resources (e.g., information, meaning, e), smart ACAP sets design conditions and guides human actors toward decisions that affect activities. Smart technologies driven by data analytics provide smart decision support, beyond a simple provision of input. They require however the human intervention to define the knowledge and constitute an action-enabling design. In a context that fosters cognitive, emotional, and social issues, people can augment their ability to act.

What emerges from this study is the notion that smart technologies start the process of capturing valuable information to be transformed into knowledge, they enable

the design of a smart behavioural context that promotes smart actions. The role of smart technologies shapes contexts with a more efficient process of assimilating knowledge, boosting quantity and quality, and amplifies capacities for self-understanding, control, and action. In García-Muiña (2020) smart ACAP is views as an enabler of the process of putting into use the knowledge and making more efficient decisions concerning the organizations activates.

Finally, this study offers a deeper conceptualization of value co-creation processes (Vargo and Lusch, 2017). I suggest that value co-creation relies on a decision process based on the integration of knowledge resources, the direction of informed actions, and the orientation of more detailed interactions, consistent with an actor's present and prospective activities. Consistently, I claim that smart ACAP allows actors to not only define activates differently but also behave differently in practice.

The study details how smart technologies affect ACAP and, consequently, how smart ACAP impact on value co-creation emerges from the AI-driven knowledge formation, who is based on their ability to support dialogue, understand the context, create and enable information ties. Smart ACAP enables actors to explore knowledge resourceness in a dynamic way, balancing the opportunities of integration information against the definition of new information. By multiplying and unbinding the range of actors' possible knowledge, smart ACAP contributes to enabling actors' activities, thus boosting value co-creation.

In the S-D logic lexicon, smart ACAP enacts a re-institutionalizing process affecting actors' practices. By offering a different view on problems and solutions as well as increasing interaction and collaboration between humans and machines, actors develop a shared knowledge around a new solution with shared meanings and understanding that enable the application of problem-solving information.

4.3 Theoretical implications

Implication concerns the role of IBM Watson to smart ACAP. IBM Watson Health supports human activities in learnable ways, and this contributes to produce changes and innovation. Learning practices unfold from the context of their ongoing production and reproduction and they become anchored to the sociometrical resources (Mele and Russo Spena, 2018). IBM Watson enables to create dialogue, understand data, create information, enable new skills. The structured and unstructured data become integrated in real-time and the perspective on absorptive capacity changes as it is generating in actions. The ecosystem actors see IBM Watson Health as a "multi-activity agent", thanks to its social dexterity and ability to create secure and context-appropriate knowledge.

This study offers three main contributions to on-going discussions on how smart technological contexts alter knowledge-based skills, in that it frames the ways smart technologies enact smart ACAP and how smart ACAP affects value co-creation practices.

First, the elements of ACAP influenced by smart technologies have been presented in an integrated way, proposing an overview of their main characteristics and showing the interrelation among them. This provides a baseline to understand how smart technologies affect knowledge-based skills. Smart ACAP enables actors to locate, identify, value, and acquire external knowledge to make better decisions by providing knowing resources that would otherwise not be available, extending relationships to construct new ideas (data) that otherwise are not available, and augmenting humans' agency to understand the important information/insights from these data.

Second, the research widens the analysis of such factors from the relationships to the value co-creation practices that form the service ecosystem, thus contributing to the literature on practices that facilitate value co-creation; as recognized by Lusch and Vargo (2014), "as more actors interact with one another through many-to-many networks, their actions and interactions change the context of other actors, increasing the dynamics and turbulence in the system" (p. 154). By addressing how these elements of ACAP can affect practices, the research explored also the way in which these elements affect the other practices of the service ecosystem through

what could be called the “knowledge integration ”, thus resulting in the value co-creation process within the entire service ecosystem. Smart ACAP elements offer opportunities to widen resource accessibility, extend actor engagement, and augment interactions in an ecosystem view. By molding the actor’s understanding of surrounding resources (e.g., information, meaning, data, social ties), better-known guides human actors toward decisions and informed operation. Although varied in characteristics, smart technologies drive the data analytics to provide smart decision support, beyond a simple provision of input. They require human intervention and constitute an action-enabling design. In an ecosystemic context that fosters cognitive and social issues, actors can augment their ability to act through smart ACAP.

Third, this study provides a deeper conceptualization of the processes of co-creation of value (Vargo and Lusch, 2017). According this view the value co-creation is based on a decision-making process based on the integration of resources, the direction of actions and the orientation of interactions, consistent with the present and prospective needs of an actor. The actor's skill is key to enhancing co-creation, but it is important to develop a deeper understanding of how this ability, as well as new forms of self-understanding and self-learning, can be shaped by AI, through knowledge-in-context activities. of the actor. Consistently, it is claim that smart ACAP allows actors to not only choose best practices in different but also behave differently in practice.

In sum, the study details how value co-creation emerges from the AI-driven smart ACAP, who evolve the context on the basis of their ability to learning and knowing. Smart ACAP enables actors to explore resourceness in a dynamic way, balancing the opportunities of integration options against the performativity of achieving them. By multiplying and unbinding the range of actors’ knowledge, smart ACAP contributes to influencing their activities, thus sparking a virtuous circle of value co-creation.

4.4 Managerial implications

The concept of smart ACAP and the framework here presented offer important insights for practitioners. The research provides empirical evidence of potential positive effects that go beyond the "smart" dyadic relationships and suggests a framework useful for managers to understand sources of value co-creation. These insights have the potential to inform the way relational elements shake the service ecosystem in which a firm operates. Taking into account the multiple knowing elements that can affect both relationships and market practices and how these elements lead to the value co-creation, allows practitioners to start the chain of knowing events that may occur, to incremented additional important learning activites to the entire ecosystem. Practitioners, in fact, should extend their attention from the basilar direct interactions – as that firm-customer – to relationships with third parties that are likewise relevant in the co-creation practices. What is known in a relationship can affect all others, resulting in cascade effects that are more informed. First, managers need to see themselves as enabler of smart ACAP.
This role requires an accurate understanding of the uses of smart technologies to adapt contexts and tailor smart ACAP to leveraging user data to improve knowledge. In the healthcare ecosystems, managers need to reconsider the healthcare service providers to prompt innovative solutions in the healthcare value co-creation practices using smart technologies. Their combinations can offer expedited healthcare knowledge saving significant costs as well as providing tailored therapy and, in some cases, unexplored healthcare solutions for improving outcomes. smart technologies ecosystem-based solutions ensure that healthcare innovation continues and can stay robust in the future.

Second, practitioners need to integrate a discussion of smart ACAP in their strategic and managerial processes. Considering the insufficient investigation of AI performance, managers need to understand better how smart technologies affect learning and knowing process. In particular, they need more insights into which combinations of cognition and sensing, automation and personalization, machine and human will be accepted.

Finally, by evaluating how smart ACAP affect value-co creation, practitioners should be aware of the implicit interactions taking place in the wider smart-co-constructed context. The process of information creating that results from continuous interactions and dialoguing helps actors more importance to the social context and the structures in which they are embedded; it also eases resource integration and mutual value co-creation among different actors. Managers should devote more attention to factors that can moderate the success or failure of knowledge creation. More knowing data is capable of presenting more possibilities. It can help physicians, nurses or even pharmacists with their perspective. In healthcare, it brings in different scenarios to ensure that medical innovation continues. A healthcare practitioner can run various simulations and offer proactive healthcare solutions to patients. It further presents a possibility to explore new healthcare approaches so that healthcare practices stay robust in the future.

4.5 Limitations and further research

This study suffers several limitations that might be addressed in future research. The study analysed the IBM Watson case over a limited period of time, providing only a snapshot of the phenomenon in the healthcare context. From a systematic longitudinal approach, could be interesting analyse how the phenomenon of co-creation develops over time and the long-term impact of its effects, and also in different contexts. The study focuses on the process of value co-creation and smart ACAP while further research could analyze in-depth the outcomes of the process.

Furthermore, the research relies on a single qualitative case study based on the healthcare context. First, this research could be replicated in a different sector in order to explore learning and knowing elements influenced by smart technologies within an ecosystem.

Second, although this research aims to highlight an exemplar of value co-creation and smart ACAP, this approach may lead to an excessive emphasis about influence

of smart technologies. In further research, also co-destruction could be both taken into account, by investigating why some tensions within the value co- practices result in negative process and outcomes while other in co-creation. Furthermore, further research could analyze changes in practices prompted by tensions that occur.
Some limitations are related to the smart technology studied. This study elaborates the specific features of IBM Watson and its applications are expected to develop and potentially combine with other associated technologies. Future research could explore learning and knowing process in combination with the Internet of Things, Internet of Everything, or other cognitive technologies. Additionally, the online written interviews could be integrated with interviews to other actors involved, such as patients.

Third, although this study collected a large quantity of data, future research would benefit from following or even observing, individuals as they proceed through the smart ACAP-process phases. This could yield deeper insights into the magnitude of the efforts required to overcome barriers as the smart ACAP process unfolds. Although challenges exist in all phases, they may increase in number and magnitude as more people become involved in service ecosystem.

Finally, in extension, this study underscores the need of further understanding the role of individuals in other innovative settings within service. Examples include the role of individuals in open innovation processes (West and Bogers, 2014), digital transformations and digitalization (Sjödin, Parida, Leksell, and Petrovic, 2018), servitization (Lenka, Parida, Sjödin, and Wincent, 2018), and a circular economy (Frishammar and Parida, 2018), which represent trends that currently change the innovation of service.

However, there are plentiful opportunities for research that undertake further explorations of smart technologies in knowledge-based skills and frontlines in general. Table 4.1.1 provides a list of suggested research topics. The suggested research questions are organized according to the three theoretical proposition . It does not attempt to be exhaustive; rather, this list offers directions for researchers interested in smart ACAP in services, value-related phenomena, and perception and cognition.

Table 4.1.1 – Future research agenda

Potential research topic	**Selected questions**
Smart ACAP in services offer users value propositions leveraging cognitive resources	Using insights from smart ACAP, is it possible to establish relevant design criteria for developing valuable services? What are the determinants of smart solutions that are simultaneously customizable (to firms/customer knowledge needs), (technically) feasible, and viable (with a "knowledge -based skills" model)? In which service contexts are smart ACAP's cognitive resources more important? Can the knowledge transformation by smart technologies be optimized by addressing the interaction between actor-smart technologies?
Actors' personal values and knowledge become salient through interactions with smart technologies cognitive resources	Which value priorities are predominant in different service contexts and different firms/customer segments? Do value and knowledge priorities change when moving from a focal actor level to a value and knowledge constellation level (micro to meso/macro)?

Actors evaluate smart ACAP' value co-creation potential according to the dimensions of perception and cognition	Which element of perception and cognition of smart ACAP is predominant when evaluating service interactions with smart technologies? How do actor' evaluations of value co-creation/destruction potential change over time? How to design human-smart technologies interactions that will maximize the ACAP capacities? Which ethical considerations (e.g., privacy, lack of agency) affect evaluations of value co-creation potential? What effects do smart technologies have on actors and service providers' roles in value co-creating networks? How do they affect features of smart ACAP? Do novel abilities to identify, value and acquire external knowledge affect the quality of service?

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