

## From knowledge co-creation to value co-creation and beyond: challenging global emergency in smart service systems.

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### Abstract

*The study seeks to investigate the impact of pandemic on teaching and learning processes involved in Higher Education (HE) by analysing the way in which knowledge exchange and value co-creation are reframed through ICTs and technology.*

*The adoption of the interpretative lens of Service Science permits to reread HE as a smart service system. The empirical research, based on content analysis as an inquiry, analyses: 1) the transformations introduced in technology adoption, information sharing, knowledge and value co-creation to comply with the disruption “imposed” by the sanitary emergency; 2) the way in which this transformation can introduce novelties in Higher education system. The results identify the different drivers for value and knowledge co-creation that can be implemented in technology-enhanced teaching and learning and the different novelties that can be generated from the emergence of innovation.*

### 1. Introduction

Covid-19 forces companies and organizations all around the world to comply with a complex set of technological, political, social, and managerial evolutions, which are changing dramatically business management, people’s interactions, daily lives, and work environment (Kabadayi et al., 2020; Heinonen and Strandvik, 2020). The challenge to the global pandemic requires companies to reorient their strategies, redesign their business models and redefine their relationships with stakeholders.

This redefinition seems to have effects both on human’s interactions and on their use of technologies by introducing new waves of innovation (Azoulay and Jones, 2020) in different industries and business contexts and by advancing new tools, platforms, applications and means to manage old problems

(relational asymmetry, information sharing, knowledge management).

To analyze how the technological challenges posed by pandemic can redefine human-computer interactions, organizations should be re-conceptualized as smart service systems, (Lim et al., 2016; Lim and Maglio, 2019) to take into account how the increased connectivity and the technological “forced” evolution of Covid-era era can improve information sharing, data analysis and knowledge exchange analyze by improving innovation opportunities (Spohrer and Demirkan, 2015; Polese et al., 2020a). Through the lens of service science, organizations can be explored as complex systems in which the active engagement of people, through human-computer interactions and information sharing with organizations, can lead to the co-development of innovative solutions for the well-being of all the stakeholders in the system.

Based on the recognized relationship between *value co-creation* (VCC) and innovation (Lusch and Nambisan, 2015; Storbacka et al., 2016; Helkkula et al., 2018), this work aims at rereading contemporary companies that seek to manage epidemic as smart service systems, grounded on technology-enabled interactions that allow the constant exchange of skills and the sharing of risks, resources and responsibilities to pursue jointly common value propositions (Romero and Molina 2009).

Despite the relevant role of technology on the emergence of innovation, previous studies on service innovation gradually shift towards the attention from the study of the “simple” technological innovation to the adoption of a systems orientation (Vargo et al., 2015) which identifies the need to integrate the technological dimension with the human side of innovation. Therefore, it can be noticed that the use of technology per se does not imply the automatic achievement of innovation: only through the application of human skills and knowledge new entities can be co-created.

In smart service systems, the actors that encourage actively the generation of innovation are defined lead users and their key contribution is the sharing of knowledge: this process can be defined as *knowledge co-creation* (KCC, Prahalad and Ramaswamy, 2003; Hsieh and Chen 2005; Von Hippel 2005). Knowledge co-creation involves the analysis, sharing, assimilation and creation of knowledge (Su et al., 2016) obtained from the contribution of unique resources and valuable skills from a series of actors during value co-creation. Through the integration of different capabilities and competences, each stakeholder can provide the right cognitive variety to stimulate the generation of new knowledge, develop new ideas for organizational change, improve extant services or the create new ones. Different types of stakeholders, in various exchange contexts and in different economic and social conditions can release multiple resources, by giving rise to various innovative practices.

Due to the interconnection between knowledge co-creation (KCC), value co-creation (VCC) and the emergence of co-developed innovation (co-innovation) in current smart service systems, the aim of the study is to reveal, on the one hand, the key enabling dimensions for knowledge co-creation and value co-creation in contemporary organizations engaged in the fight against Covid-19, and to explore, on the other hand, how these can be dynamically combined through multi-levelled relationships between human-computer interactions and knowledge integration processes to give life to new technologies, business processes, strategies, value.

Therefore, the study seeks to answer the following research questions:

*RQ1- Which are the enabling dimensions that activate the co-creation of knowledge (KCC) and new value (VCC) in smart service systems to manage the pandemic?*

*RQ2- How can the-created new values and knowledge lead to the co-development of innovation?*

Knowledge co-creation, value co-creation and the co-development of new value and practices are dynamic processes arising from the combination of multi-levelled transformations at individual, relational and collective levels of exchange (Polese et al., 2020b) that can determine social change (Visvizi et al., 2018) in the long run. To challenge the pandemic, smart service systems should address a paradox by managing continuity, firstly, and by transforming and innovating interactions, relational modalities and co-creation practices, secondly.

The article aims at advancing the debate on two key issues: 1) how the new technological tools and the new human-computer interactions required to comply with the new scenario and with the requirements posed by the

pandemic can improve knowledge and value sharing and co-creation (RQ1); 2) how smart service systems can manage the emergence of innovation and become catalysts for social change (RQ2) to shape and renew the rules, interactions and culture of the communities with which actors are engaged.

Starting from the IAU (International Association of Universities) Global Reports, that provides a first global overview of the disruption caused by COVID-19 on higher education, the study analyses some cases from the education context through the lens of Service Science to identify the different technological touchpoints that can be implemented in teaching and learning processes to boost co-creation of knowledge and value and identify the different mechanisms that can foster the emergence of innovation.

The identification of the enablers of innovation and societal changes and of the new interaction modalities and main strategies to challenge the pandemic can help scholars and practitioners identify the key drivers to overcome social and economic crisis. Moreover, the elaboration of a framework that analyses how technology can redefine human-computer interactions to enable value co-creation and innovation can advance the conceptualization of systems innovation to go beyond the technological focus on innovation revealed in extant research.

## **2. Theoretical background**

To address the key role of technologies in the redefinition of contemporary markets, the most recent theories on services should be considered as the most appropriate theoretical foundations that can help redefine organizations as complex service systems which, through the interactions between actors, enhanced by smart technologies and ICTs (information and communication technologies), can co-create value (Davis et al., 2011; Troisi et al., 2021).

By proposing the concept of smart service system (Barile and Polese, 2010; Lim et al., 2016), Service Science explores the impact of information flows, enhanced through digitization, on the co-creation of value and knowledge to identify the factors that enable systematic innovation.

For this reason, the section defines, firstly, the key elements of smart service systems and, secondly, the processes of value co-creation (paragraph 2.1) and knowledge co-creation (paragraph 2.2) that could be generated multi-levelled organizations.

### **2.1 Smart service systems and the role of technology**

Service Science (Spohrer et al., 2007; Maglio and Spohrer, 2008; Maglio et al., 2019) defines organizations as service systems, or “configurations of value co-creation deriving from a set of people, technologies, value propositions, which interact with other service systems internally and externally through shared information” (Spohrer et al., 2008, p. 5).

With the advent of digitalization, service systems are reframed as smart service systems (Barile and Polese, 2010; Lim et al., 2016) in which the tools offered by new technologies provide new ways to increase the co-creation of value and, therefore, innovation (Edvardsson et al., 2014).

The main dimensions of service systems (organizations, people, technology, shared information) can be redefined through the application of smart technologies that improve automation and connectivity, by enhancing interactions and information exchanges between actors (Lim et al., 2016). Smart service systems create value through the synergy deriving from some relevant enabling dimensions, the so-called “4Cs” (Lim and Maglio, 2019): 1) connection; 2) data collection; 3) communication; 4) computation.

The transition from service systems to smart service systems can be understood as the result of the “urgent” need to move to a data-based approach to the study of the emergence of value co-creation processes. Therefore, reformulating service systems through the lens of smartness helps to understand the implications of ICTs on organizations, on the ways of sharing information and of technologies, which enables, facilitates, intensifies exchanges or give life to new relational modalities.

The dynamic and unrepeatable synergy among the 4 Cs can give rise to the co-creation of value and the systematic creation of innovation (Carrubbo et al., 2015), by creating in the systems a continuous state of change and innovative tension based on the search for the proactive co-evolution of organizations to challenge environmental dynamism. The information exchanged - which originates from a continuous collection of raw “data” and of potentially relevant information - is interpreted and “aimed” at learning, by increasing the effectiveness of decisions and improving the service (Ng, 2015).

The main elements of service systems (people, organization, technology, shared information) can be redefined through smart technologies, that enhance the automation and connectivity in the system, by improving interactions and exchanges of information between people and organizations (Lim et al., 2016). As depicted in Figure 1, organizations-people interactions are boosted by the exponential increase of contact points and technological channels (“smart” dimension 1: connection). Secondly, the information exchanged is

more immediate and transparent (“smart” dimension 2: communication) through technologies that are mostly focused on data collection and analysis (“smart” dimension 3: data collection) using the application of analytics (“smart” dimension 4: computation) aimed at extracting relevant information from the data that favours the co-creation of value, by helping the system adapt to environmental changes and overcome crisis by adopting flexible models. ICT-enhanced tools and solutions enable the continuous collection of data, which if managed appropriately (Lytras et al., 2021), allows at obtaining new value from the data collected. The concept of smart service systems (Barile & Polese, 2010; Lim & Maglio, 2016, Spohrer et al., 2007; Maglio & Spohrer, 2008) permits to explore the active engagement of people, who through human-computer interactions with organizations can co-create value and innovative solutions. In this way, the adoption of Service science can contribute to conceptualize the capability of contemporary systems organization to react to environmental turbulences by transforming the crisis into an opportunity for innovation through technology and information sharing, which helps interpreting and overcoming the unpredictable phenomena by reducing chaos and fostering the enrichment of new knowledge.

## **2.2 From value co-creation to knowledge co-creation: the pursuit of innovation to challenge emergency**

Service science and the conceptualization of smart service systems permit to analyze organizations as complex configurations of actors that integrate resources, communicate, share information and compute data to co-create value and new knowledge. Thus, this perspective can offer the right interpretative schemes to analyse how private and public companies in Covid era can adapt and re-adapt their co-creating activities and knowledge sharing practices through new human-computer interactions to transform the knowledge generated into innovative insights that produce benefits for the entire community in a win-win logic.

Conceptualizing contemporary businesses as smart service systems allows to shed light on the transformative role of ICTs (Akaka et al., 2019) and information management (Lytras et al., 2021) in the regulation and coordination of interactions/relationships by revealing the mechanisms that foster efficient ways of addressing emerging challenges and disrupting events (Visvizi & Lytras, 2019).

The exploration of how technology redefines human-computer interactions in smart cities-



The novelties created enrich the system with renewed social roles, platforms, meanings, by providing actors with a new culture that institutionalizes and reproduce the new entities generated over time. The arrow in the figure represents the downward causation (Löbner, 2013; Lawson, 2013; Peters, 2014) effect of social reproduction that, after exchanges, renew the values generated over time through the externalization, formalization and institutionalization of knowledge that can lead to continuous improvement. The new values, knowledge, beliefs and meanings co-created are re-institutionalized thanks to the emergence of new elements and properties that transform the “old” resources, that are different from the initial state and do not represent the outcome of the simple “sum” but have unexpected added value.

### 3. Methodology

To address the two research questions introduced above, the empirical research analyzes the sector of Higher education by collecting information on the impact of Covid-19 pandemic on learning and teaching tools and strategies from strategic documents and official statistics available on the Internet.

In particular, the IAU (International Association of Universities) Global Survey Report is employed to detect the main drivers that helped Italian universities (intended as smart service systems) survive the Pandemic through knowledge and value co-creation processes (RQ1). Then, starting from the identification of the main enablers of KCC and VCC, the new kind of novelties generated (RQ2) are categorized. The goal is to classify some drivers that can help contemporary universities overcome and manage crisis, environmental turbulence and technological and market evolutions.

The work adopts an exploratory qualitative approach based on a content analysis as inquiry (Losito, 1996), which allows at extracting from the texts (the unit of analysis) a smaller number of categories and to detect some focal points and key concepts (Krippendorff, 2004) relating to the different variables investigated through the application of semantic criteria established by the researchers.

Therefore, based on the key elements of the service systems and the sub-dimensions of innovation introduced in the previous paragraph, the content analysis sketch is divided according to the key variables and sub-variables shown in Table 1.

<b>RQ1</b> <b>Enabling factors for value co-creation and knowledge co-creation</b>	Enabling dimensions of smart service systems for VCC	People-Organizations Technologies Shared information/communication Computation Data collection
<b>RQ2</b> <b>Key drivers that foster the emergence of different kinds of novelties and innovation</b>	Innovation outcomes	New attitude, mind-set, culture New interaction and communication modalities New skills, rules New technological and interpretative capabilities

Table 1. The content analysis sketch

As regards the first research question, the main archetypal elements of the service systems (discussed in paragraph 2.1) that can act as enabling dimensions for the co-creation of value and knowledge are employed as macro-variables that can guide content analysis.

The outcomes of the co-creation of value and knowledge are investigated as antecedents of innovation (DR2) to detect the new values and knowledge produced within the Higher education system-

For the investigation of the different types of novelties generated, the sub-dimensions identified in the literature review (reported in paragraph 2.2), i.e. new attitude for organizations, new interaction modalities, new skills for people, new capabilities are considered as enabling factors for the emergence of innovation.

The texts have been explored through complex process of semantic interpretation. The variables investigated have been sub-divided into keywords useful to facilitate the search for topics and sub-topics within the text, which are then further specified in some sub-dimensions for each variable. The textual units are coded independently by three researchers based on a substruction process (Dulock and Holzemer 1991), which follows a synthesis approach that mediates between deduction (from general variables to specific keywords) and induction (from keywords to further specific sub-dimensions).

### 4. Results

The empirical research analyzes the IAU Global Survey on the impact of Covid-19 on universities and other higher education institutions. The report is part of a large set of research activities undertaken by the International Association of Universities (IAU), the leading global association of higher education institutions and organisations from around the world partner of UNESCO, to evaluate the consequences of pandemic on education sector.

	Variables	Sub-dimensions
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#### 4.1. The redefinition of Higher education as a service system during Covid era

Higher education (HE) services in Covid-era can be interpreted as a series of technology-mediated interaction and experiential learning processes between students, teachers and the entire educational community, characterized by the enrichment of actor's knowledge, the sharing of meanings, languages and of a cohesive culture aimed at meeting system community goals (Erasmus and Albertyn, 2014; Lazarus, 2007).

Hence, due to the systems, interactional, technological cultural dimensions strictly involved in educational service, grounded on the exchange of knowledge, know-how, skills and capabilities through new "imposed" technology-enhanced learning tools, Higher Education can be reinterpreted as a smart service system.

The reinterpretation of HE as a smart service system implies the definition of education service as a complex process based on learning, teaching and evaluation activities performed through an integrated sets of technologies used by different co-creating actors with different goals and skills connected with multiple relationships based on the exchange of immaterial resources and knowledge.

Therefore, the analysis of IAU report, that helps the identification of the new interaction modalities and tools introduced after the advent of Pandemic and of universities' capabilities to tackle the emergency, can allow the investigation of: 1) the different enabling dimensions that can be used each level to foster value co-creation and knowledge co-creation through technology-enhanced learning (RQ1); 2) the emergence of innovation and social in HE as a result of the evolution "imposed" by the pandemic (RQ2).

#### 4.2 RQ1: Enabling dimensions of value and knowledge co-creation

The majority of universities included in the sample reported that classroom teaching has been replaced completely by distance teaching and learning.

The IAU Global report identifies as series of challenges that can prevent the appropriate transition from face-to-face to distance teaching: 1) the access to technical infrastructure; 2) the competences and pedagogies for distance learning and the requirements of specific fields of study; 3) students engagement and motivation.

The right technological infrastructure to communicate with students and staff is a necessary but not sufficient condition for a clear and effective. Several

institutions report that owning the right competencies in the use of technologies can be a key lever for transparent and timely information and communication flows.

Technical infrastructure and accessibility and online access are prerequisites for shifting to distance teaching and learning. The IAU Report reveals the potential gap and technological divide between developed and developing countries and between students who have access to the internet and students who do not, by making it difficult to provide every student with equal opportunities.

The report shows that a different pedagogy is required for distance teaching and learning to realize the unexpected shift from face-to-face to distance teaching and learning. The level of readiness or preparedness of teachers is the key lever for a continuing education and to guarantee the same level of quality compared to face-to-face education. Some institutions do not have a proper management structure to develop the teaching capabilities of staff in order to shift towards online learning easily and this can often result some attempts to imitate the face-to-face way of teaching by yet using distance mode.

If on the one hand the "forced" digitalization of teaching and learning offers the opportunity to adopt a more flexible service offering based on hybrid learning and on the combination of synchronous with asynchronous learning, most of the institutions that should tackle a sudden and unprepared shift to online teaching reveal that the enhancement of students' engagement and motivation are two key levers for the implementation of enhanced-teaching and learning.

The different enabling dimensions for knowledge and value co-creation identified in the analysis are shown in Figure 3.

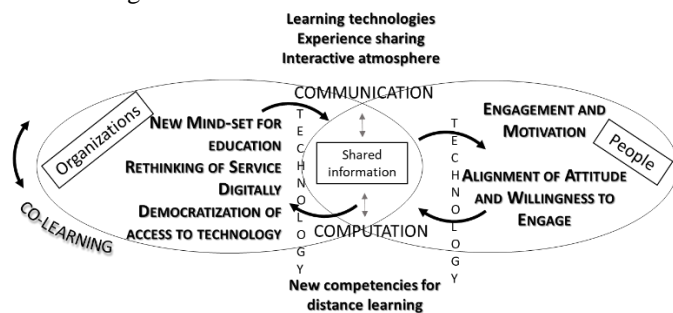


Figure 3. The identification of the key enablers of value co-creation and knowledge co-creation in higher education system in Covid-era

Hence, to help the transition to distance learning by preserving value and knowledge co-creation, Universities as organizations should change not only the methods of digital service provision but also the mind-set for education, by pursuing democratic access to

technology and rethinking the service/business digitally, as a new way of doing education and culture. Moreover, management should try to assess the ability-propensity of students and teachers in the use of technologies based on their level of digitization and their possible resistance in the use of telematic tools in work, study and of daily life.

Moreover, the people involved in the exchange (students, teachers, staff) should align their attitude, their background and willingness to engage.

Universities have the opportunity to employ smart technologies, platforms and mobile applications that enable human-computer interactions for synchronous online teaching and learning.

The learning technology tools for course interaction (such as Teams, Zoom) can support teacher and students in creating an interactive atmosphere in class. During the lesson, teachers can use various functions to enable the teacher-student interaction function and to let all students “raise their hands” or answer questions through different devices.

The integrated use of technology-enhanced learning tools can facilitate the sharing of experience, tacit and codified knowledge to obtain new knowledge, co-create new value and encourage co-learning processes. The use of IRS (interactive response systems platforms) can deliver learners’ feedback to teachers and help gain real-time perceptions of students’ understanding and facilitate the enhancement students’ motivation. In this way, new ways of exchanging knowledge and creating new knowledge are generated. Students and digital natives can provide teachers with their experience, especially in the field of technology, due to their familiarity with the Internet and with ICTs.

Thus, the “forced” adoption of the new technological tools after the advent of Pandemic can permit the realization of co-learning. Education does not imply the unidirectional sharing of knowledge (from teachers to students) but empowers the enrichment of both students and teachers experience, know-how, tacit knowledge, culture and beliefs.

#### **4.3 RQ2: Innovation outcomes**

Many of the respondents of IAU Global Report understand the experience of working and teaching from distance as an important opportunity to learn and to propose more flexible learning possibilities, to explore hybrid learning and mix synchronous with asynchronous learning.

Hence, the unplanned and unprepared implementation of distance teaching and learning can lead to the improvement of both students’ and teachers’ skills who can learn to use new tools and systems to enable distance teaching and learning. Moreover, a shift in the mindset of people and in the attitude of university

as an organization can be realized to open a new horizon of opportunities for teaching and learning.

As declared by several respondents of the survey, by exploring the potential of flexible learning, HE can benefit from an increase in innovation in the field of teaching pedagogies (e.g. in the general enhancement of skills) as well as in the delivery modalities of teaching and learning. Institutions may choose to invest further in technical infrastructures to enable the shift from management learning systems to cloud services, to digitalisation of administrative processes and of access to documents, resources and libraries. The enrichment of digital skills can enhance the access to lifelong learning opportunities.

Through learning management systems and platforms for online teaching, new communication and relational methods for technology-enhanced learning are created, based on timely information and on the possibility of being in contact 24 hours a day, through tools such as live chat, one-to-one and personalized assistance to students, etc.

According to most institutions included in the survey, Covid-19 had a positive impact on community engagement that has been boosted through medical care for affected people, medical advice and support, science communication initiatives and community actions.

Some respondents notice that the global emergency offers the opportunity to better prepare institutions to deal with similar crises in the future. Even if in the short term they are coping with the urgency of the situation, institutions can learn about crisis management by developing resilience and agility when responding to unforeseen challenges in the future.

The introduction of new teaching, learning and evaluation practices for scholars and students can develop constantly opportunities to change and pursue continuous improvement. The novelties emerged in the cultural system through distance learning are new methods for educational service provision, which can become stable practices over time and can be maintained even after the restarting of activities in the presence. For instance, online learning courses and exams can become a more integral part of study plans. Moreover, a new smart culture for training, learning, didactics and research that redefines languages and shared meanings between students, teachers and staff is introduced.

Data on teachers and student’s performance are also stored in diagnostic reports by means of cloud systems to enhance self-systematic remedial learning. Starting from the collection of students’ opinions and behaviours, teachers can make decisions based on statistical data and adjust teaching according to the information extracted. Moreover, data mining techniques are employed to discover and obtain

knowledge from databases to support the analysis of student learning processes and the evaluation of the effectiveness and usability of online courses.

The different kinds of novelties generated in HE system through the new technological tools that enable value co-creation, knowledge co-creation and co-learning are synthesized in Figure 4.

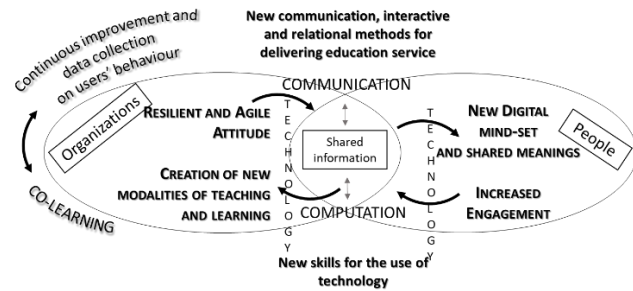


Figure 4. The different kinds of novelties generated in higher education system in Covid era

## 5. Theoretical and managerial implications

The study introduces a research agenda that encourages future research to explore how the emergence of innovation can be fostered in smart service systems by introducing: 1) a classification of the main antecedents of knowledge and value co-creation; 2) an investigation of the enabling factors that stimulate innovation are remodelled, through technology-mediated interactions to pursue co-created innovation. Therefore, the transformative role of new technologies is explored to detect how the different combinations of resources, capabilities and use of technological tools can generate innovation through different relational models, by proposing the first steps to solve the gap arising from extant research on service innovation (Akaka et al., 2019). Therefore, the study enriches the research stream that explores the emergence of innovation in smart service systems, by categorizing the different drivers that promote innovation (Abbate et al., 2019).

The classification of innovation conceptualized in this study could lead managers to understand: 1) how smart technologies can produce different innovation outcomes based on the different types of stakeholders involved; 2) how different management strategies can produce different and new values; 3) how the new outcomes produced (new knowledge and value) can be constantly promoted and renewed over time to pursue continuous improvement (through constant adaptation and proactive re-adaptation of systems in complex contexts).

Furthermore, the study helps to clarify the relationship between the efficient use of ICTs

technologies and platforms and the development of innovation (Barile et al., 2017). As a result, managers can acquire insights into the most appropriate combinations of technology and human interactions to manage the co-creation of value that can, in turn, allow for the harmonization of complex innovation processes. It is also possible to draw some suggestions how the interactions enabled by technology can enhance the dynamic integration of resources, through a constant process of adaptation and reconfiguration, thus helping to identify the main drivers for continuous improvement (Russo-Spena and Mele, 2012; Medina-Borja, 2015).

The work analyses the case of Higher Education by producing theoretical advancements on the classification of the different technological tools and drivers that can support the provision of educational services in the different moments of service provision and across the different resource integration and knowledge exchange involved in value co-creation and co-learning processes.

Education managers can understand: 1) how the use of different kind of technologies can help redefine the interaction modalities between and among students, teachers and community to challenge the global epidemic; 2) the key ecosystem's enablers for the development of different innovation opportunities through crisis resolution. Thus, the study detects, firstly, the main ecosystem's elements involved in Higher Education system to address the global emergency of Covid-19 and, secondly, how these elements can be harmonized to attain systems continuous re-adaptation that fosters social changes and transformation.

## 6. Conclusion

To clarify the opportunity and challenges deriving from Covid-19 management through technology, the findings of the study show how service systems can overcome the sanitary emergency by investing in value creation strategies that can give birth to the creation of new knowledge, rules and institutions (Gummeson, 2017a; Gervilla et al., 2020).

The framework advanced can help management, practitioners and scholars understand: 1) how technology, communication, information and resources integration are employed to challenge pandemic and perform online teaching and learning in HE; 2) how systems adaptation can lead to the introduction of new modalities for teaching and learning that can change in the long-term the relationships among teachers, students, university management and community to determine transformation and to provide organizations with the ability to overcome crisis over time and, thus, to become resilient.

The identification of the potential new interaction modalities and main strategies to challenge the pandemic can help scholars and practitioners identify the key drivers to overcome social and economic crisis. Moreover, the elaboration of a framework that analyses how technology can redefine humans' interactions and can foster social changes can address a gap in literature related to the absence of studies exploring the role of technologies in reframing community management and social innovation (Lytras and Visvizi, 2018).

The key limitation of the study is the narrowness of the textual data analyzed. Further studies can start from the dimensions identified in the framework to employ grounded theory according to a constructivist approach (Charmaz, 2002; Gummesson, 2017b), a technique usually employed in HE, to perform observation and semi-structured interviews. What is more, additional research on the topic can start from the results proposed in the current study to apply the classification of the different drivers of VCC and KCC and of the different innovation outcomes to other service systems or to other contexts.

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