ORGANIZATIONAL SOLUTIONS IN THE SERVITIZATION AND DIGITAL SERVITIZATION JOURNEY

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ABSTRACT

Purpose: The paper assesses different organizational solutions allowing customer contact over both servitization and digital servitization journey of well-established manufacturers.

Design/Methodology/Approach: The study is exploratory and based on two case studies. The first case refers to servitization taking place in the pre-digital era and it has been retrieved in the servitization literature. The second refers to a manufacturer that recently entered a digital servitization journey. This in-depth case study has been developed by applying a longitudinal approach. Empirical data has been collected through company's reports, observations and a focus group.

Findings: Servitization and digital servitization trajectories have a different nature despite the journey rests in both cases on the same traditional set of product-service systems (PSS). By disentangling the different types of PSS, the comparison of the two journeys shows that organizational solutions overlap until service modules are not commodified. Specifically, in the servitization journey the deployment of front-office staff in the delivery of advanced services is crucial. On the other hand, in digital servitization journey, R&D department is the core of service capability development and it is the servitization driver.

Originality/Value: The resulting differences coming to light from the comparison of these two journey offer manufacturers a more comprehensive understanding about the organizational solutions allowing the delivery of PSS in both servitization and digital servitization strategies.

KEYWORDS: Servitization, digital servitization, PSS, commodification of services, service capability development

1. INTRODUCTION

Servitization is not a recent phenomenon of manufacturing transformation, but the current digital transformation has dramatically enlarged the scope and the nature of this strategy of manufacturing value creation and caption (Raddats et al., 2019; Kohtamäki et al. 2020). Servitization refers not only to strategies aiming at adding services to material artefacts for customizing usability of existing products, but it implies the delivery of an heterogenous set of customer solutions based on a variety of services (Baines and Lightfoot, 2013).

Traditionally, servitization focuses on downstream extension of original equipment manufacturers (OEM) that add usability services to material artefacts. In such literature, manufacturers adopting integrated solutions rely on an internal development of service-oriented capabilities, or acquire externally service-related knowledge, asking for complex business and relational solutions (Visnjic et al., 2016; Crozet and Milet, 2017; Bustinza et al., 2019a). Servitization strategies allow indeed manufacturers to offer on the market a constellation of product-service systems (PSS), a combinations between material artefacts and a variety of more or less advanced services (Baines et al., 2017; Brax and Visintin, 2017). Despite the growing efforts of manufacturers to implement servitization strategies, many authors highlighted that the increased customer interaction at the core of the implementation of PSS opens areas of uncertainty for manufacturers often lacking service related capacities and many manufacturing firms fail providing service innovations (Neely, 2008; Benedettini et al., 2017).

Today, scholars are focusing more and more on the exploration of the main drivers fostering a service capability development, especially in relation to the servitization journey (Martinez et al., 2017; Baines et al., 2020). One crucial element seems to be related to the variety of organizational solutions allowing manufacturers to effectively taking advantage of servitization strategies, where

servitization can be investigated by applying to PSS both an integrated and a modular perspective (Brax et al. 2017; Rajala et al. 2019; Bustinza et al., 2019b; Sjödin et al. 2019).

Building upon the touched upon literature, recent papers are showing how digital technologies are complexifying the meaning of servitization and the nature PSS modules (Paiola and Gebauer, 2020; Kohtamäki et al., 2020; Hsuan et al., 2021). Recently, Hsuan et al. (2021) underline the importance to look at PSS by taking into account software modules as well and explore the operational characteristics of product-service-software (PSSw) modules through the digital servitization journey.

In such debate, digital technologies foster a different way to deliver services where indirect interactions between customer and service provider allow service and therefore servitized manufacturers to reduce the need for having strong person-to-person customer interactions (Sampson and Chase, 2020).

Despite the recent literature is stressing the dynamical nature of this manufacturing strategy, our knowledge about the dominant organizational configurations along the process and path of servitization and digital servitization is still limited. Specifically, there is still a lack of in-depth longitudinal studies of individual manufacturers. This paper aims to fill the gap and assesses different organizational solutions allowing customer contact over both servitization and digital servitization journey of well-established manufacturers.

By disentangling the servitization journey through the different value configurations of PSS, the paper offers two exploratory case studies. The first case refers to the servitization journey of Océ taking place in the pre-digital era. The second refers to an important global player specialized in the design and production of machine tools for industry and recently entering a digital servitization trajectory.

The paper is structured as follows. In Section 2, we explore the theoretical background and the development of the propositions and the hypothesis. Section 3 presents data, methodology and section 4 provides discussion on findings of the empirical analysis. Section 5 concludes by adding some insights for future research.

2. THEORETICAL FRAMEWORK AND HYPOTHESES
2.1 The Servitization journey and organizational strategies
The efforts of manufacturers to implement servitization strategies are increasing and manufacturing transformation through servitization is expanding worldwide (Baines et al., 2017). Several case studies and empirical analysis underlined the risks and opportunities opened by servitization, and literature has explored both the types of capabilities necessary for entering servitization trajectories and the stages of the organizational transformation during servitization of well-established manufacturers (Raddats et al., 2017; Jovanovic et al., 2019).

Focussing on specific configurations of customer solutions, many authors highlight that service capability development do not rest on a unidimensional business strategy, but multiple paths lead to superior financial performance (Sjödin et al. 2019). In this regard, Bustinza et al. (2019b) underline the strong relation between organizational strategies and levels of advancement of delivered services. Specifically, the authors suggest that the introduction of base and intermediate services in the delivery of customer solution is more effective by outsourcing to KIBS firms the delivery of service related modules. When instead the customer solution asks for the integration of advanced services, the manufacturer benefits from maintaining in-house related service activities (*idibem*).

In servitization, the organizational transformation is not a trivial process. The co-existence of these organizational models has been empirical addressed by several papers and a part of the servitization literature opens the discussion around servitization as a strategic trajectory characterized by a variety of combinations characterised by different degrees of integration between services and products (Crozet and Milet 2017; Lenka et al. 2018). Martinez et al. (2017) have paved the way for the exploration of servitization as a linear and progressive journey, through which a manufacturer define the path of service capability development and the service innovation approach. Here, the authors underline that recently several firms focus their structural reorganizations by developing in-house

service skills and gradually enlarging the services portfolio, moving from product-based to results-oriented services.

Consistently with Martinez et al. (2017), Baines et al. (2020) underline the importance of considering the organizational change process of manufacturers competing by adding advanced services in their portfolio. The authors open the debate on the servitization progression model explaining how five forces interplay and collectively determine progress through the servitization journey. The journey is characterised by linear and unidirectional steps which are defined by organic, intuitive and repetitive activities at the core of the service capability development.

At a macro-level, following Brax and Visintin (2017), this journey rests on the different configurations of PSS, from the 'least servitized' on top to the 'most servitized' on the bottom. Specifically, the metamodel propose by the authors is made up of eight generic value configurations where the operational responsibility over the PSS life cycle relates to customers, suppliers, and third parties:

I.   Products with limited support, the supplier manufactures the equipment and sells it to the customer. Services, mainly 'base services' such as break-fix and maintenance services, are provided by the customer, the supplier, or a third party;

II. Installed and supported products, the manufacturer delivers the solution system installed and provides support services;

III. Complementary services are other services that a manufacturer provides as separated offer from the main solution system;

IV. Product-oriented solutions are comprehensive packages including solution design, implementation and support and this category of services is relational;

V.   Systems leasing, the supplier provides without the transfer of the ownership the customer a fully implemented system and provides the support services;

VI. Operating services, the customer receives a fully integrated solution and supporting services, and the provider takes care of operating it;

VII. Managed service solutions are output- or outcome-based solutions in which the customer owns the system and the systems can be produced in collaboration with third parties or completely sourced from them;

VIII. Total solutions is similar to managed service solutions but in this case the solution provider owns the systems and typically the contract period for the solutions is very long.

P1: Servitization can be identified as a trajectory mapped by different value configurations of PSS.

By implementing a literature review and disentangling the different value configurations of PSS, Brax and Visintin (2017) underline how these categories refer to specific kind of organizational configurations. Clearly, PSS are not a homogenous set of customer solutions, but there are several value configurations characterised by a flexible equilibrium in the operational responsibility where service modules are delivered by different actors. Here, modularization enables different organizational units, external or internal to the manufacturer, to develop specialized service capabilities and innovate on them.

The development of these PSS modules requires indeed to take advantage in an effective way of a network of external suppliers throughout the system's life cycle (Paiola et al. 2013). The design of the solution delivery process requires the definition of the role of both the focal firm and the specialized component suppliers, subcontractors and service providers (Davies et al., 2007; Pawar et al., 2009). Therefore, depending on the distribution of the operational responsibilities between manufacturers, service providers and customers, the optimal organizational solution can vary. Evidences collected by Brax and Visintin (2017) highlight that in the case of product-oriented solutions, one of the most diffuse and effective organizational solution for manufacturers entering servitization is to be a system integrator (Matthyssens and Vandenbempt, 2010; Vicintin, 2012; Kowalkowski et al., 2013). Moving instead to the total solution, the system integrators are mainly service firms and manufacturers might benefit from being pure system seller (Davies et al., 2007).

These evidences made clear why it is important to investigate service capability development by disentangling the different PSS. Servitization literature agrees on the fact that integrated solutions are not the only organizational configurations possible and that breaking down PSS into modules allows to reduce the complexity of such variety of costumer solutions, increasing flexibility and scalability in the implementation of PSS (Rabetino et al. 2018).

P2: Different value configurations of PSS mirrors different organizational structures.

2.2 The digital servitization journey and the customer contact

Combining the insights related to the digital servitization literature with the literature on PSS and modularity, Hsuan et al. (2021) put forward the debate of servitization journey and introduce the concept of Digital Servitization Cube (DSC). Here, digital technologies entering the decomposable 'traditional' PSS define a manufacturers' servitization journey that rely on product-service-software (PSSw). Following the authors, PSSw are made of modules related to product, service and software that can be mixed and matched through the manufacturer's journey. The paper revealing the operational characteristics of product-service-software modules underlines how during the journey digital technologies allow a degree of modularity in compliance with the needs of open or proprietary systems.

Paiola and Gebauer (2020) exploring servitization by applying a digital lens (i.e. digital servitization) underline that in such a framework product knowledge and specific manufacturers' resources and capabilities are a starting point for service business development. However, in the servitization literature, the success or failed of servitization strategies is mainly identified by the acquisition of specialized skills mostly related to customer interaction (i.e. front-line or front-office) rather than by exploiting skills related to the manufacturing processes (Sampson, 2014).

Consistently with this view, Jovanovic et al. (2019) highlight that the process of service capability development over the servitization journey relies on an internal ecosystem where "the way front- and back- office capabilities are developed as well as the interdependencies are important considerations for servitizing firms" (*ibidem*, 474). Several papers present case studies, such as IBM and Nokia, confirming that at the core of servitization there is the formation of a strong 'front-office' unit in charge for developing and delivering integrated solutions (Sampson, 2014). In this regard, literature shows a sort of consensus on the fact that the servitization journey rests on front-office solutions units and relationship-based capabilities.

However, as suggested by the recent paper of Samson and Chase (2020), the massive diffusion of advanced digital technologies fosters a radical change in the customer contact approach. Here, IoT technologies, related to what Porter and Heppelmann (2014) called "smart" and "connectivity" components, create value allowing manufacturers to increase the replicability of information gearing. The main point here refers to the power of digital technologies to shape the nature of service modules, defined as interactive business processes.

Traditionally, service has been defined according to customer contact and it was in need of a well-developed front-office in the structural organization of the customer solution provider. Today, however, interpersonal interaction with customers are going to be replaced by automated systems, especially in the case of more complex and advanced services (Samson and Chase, 2020). Chase (2010) recognises that interactions are mainly supported by digital systems allowing remote interaction with providers, and self-service.

Following the reconceptualization of service imposed by the recent technological wave characterised by IoT technologies, it seems that software modules not only enlarge the complexity of PSS by opening to product-service-software trajectories (Hsuan et al., 2021), but support a sort of commodification of services radically changing how the service is delivered. In such a context, service capability development does not pass through the establishment of front-office and the adjustment of service related skills. Profitable services capabilities base on the industrialization of the back- office allowing the exploitation of the potential of new technologies and the development of service platforms flexible enough to fit individual customer contexts (Reinartz and Ulaga, 2008).

These arguments open the debate about the similarities between the organizational strategies in place during the digital servitization and servitization journey. As indeed suggested by Samson and Chase (2020), "offerings that involve customer interaction are fundamentally different from those that do not involve interaction, and should be managed differently, even if in the same industry" (*ibidem*, 1064).

Hp1: Servitization and digital servitization journeys do not foster similar service capability development of manufacturers especially for the most advanced PSS.

3. CASE STUDY: METHODOLOGY AND DATA COLLECTION

We explore service capability development in both servitization and digital servitization journey by applying a qualitative research method (Miles and Huberman, 1994). Specifically we implement a comparative and exploratory analysis by exploiting a quite well known case study of servitization and conducting a more in-depth longitudinal study of an individual manufacturer entering servitization in the former days.

The purpose of exploratory research is not to provide an accurate description of a phenomenon, but it is to establish the relationships between different variables and "assess phenomena in new light" (Saunders et al., 2009, p. 139). This method allows therefore to explore relation between service capability development and both servitization and digital servitization journeys.

The first case bases on the servitization journey of Océ (Visintin, 2012). Specifically, we have exploited data related to the Océ's Wide Format Printing Systems business unit (WFPS) selling Wide Format (larger than A3 size) equipments, and offering software and services such as workflow and output management software, consulting services, maintenance services and financial services. Océ WFPS has been the market leader in the Wide Format segment for several years and today is part of the company Canon Solutions America. The servitization journey of Océ dates back to 1997 moving from the delivery of basic services to more complex solutions. The case offers several information regarding the way front- and back- office capabilities are implemented as well as how the interdependencies between the two change over time.

Consistently with this case study, we have developed a comparative case by collecting secondary and primary data and by taking advantage of a variety of sources, such as reports published on the web sites of the selected company (in what follows Alpha). Company Alpha is an important global player specialized in the design and production of machine tools for industry providing different services, such as technical assistance, maintenance programs and training. Primary data have been collected through both semi-structured interviews, a focus group and participatory analysis. Interviews lasted on average an hour and are digitally recorded to facilitate the use of transcripts for data analysis. The of analysis of this second case cover the period 2019-2021.

4. RESULTS AND DISCUSSION

As suggest by the literature, the analysis results of the service capability development in the two cases are presented by focussing on three main components: the front-office (i.e. service department), back- office (i.e. R&D department), and the interdependencies between the two.

Taking advantage of the two presented propositions, we map the two journeys through the different PSS proposed by Brax and Visintin (2017). Literature suggested indeed that servitization can be identified as a trajectory consisting of different steps that can be mapped by the value configurations of PSS mirroring different optimal organizational structurers. Since we do not focus on the payment model, we decided to do not consider systems leasing (V) in our analysis.

Our results show that in both cases, the two basic types of PSS, i.e., products with limited support (I) and installed and supported products (II), open the servitization journey. However, in Océ services related to support and delivery referred to two separate service departments, in Alpha these services were in charge to a single office taking advantage of a strong relation with both back-office and specialised external providers.

In the servitization journey of Océ, it is clear that the jump from these basic PSS to more complex configuration of PSS has relied on the definition of a leader with a service oriented background. This leader was indeed the vice president for customer service and his first move was to merge the two service departments into one organisational unit, under his direct control. On the contrary, Alpha shows that the leading role is taken by some leaders of the R&D department driving the company through the servitization journey:

"R&D department started in 2019 to develop a software able to codified all the information related to our products and collect them into micro-modules. This can allow us to interact with our customers over the life cycle of our machines and offer to them different kinds of solutions in a more efficient way" (Informant A, Alpha)

Despite the two cases underline that complementary services and product-oriented solutions are delivered by the straightness of respectively service and R&D department, in both cases, a crucial role is played by the interdependencies between the two department. Both Océ and Alpha have indeed presented in this phase of the journey a strong attention in the building of a solid and effective alignment between the service and R&D departments (see Figure 1).
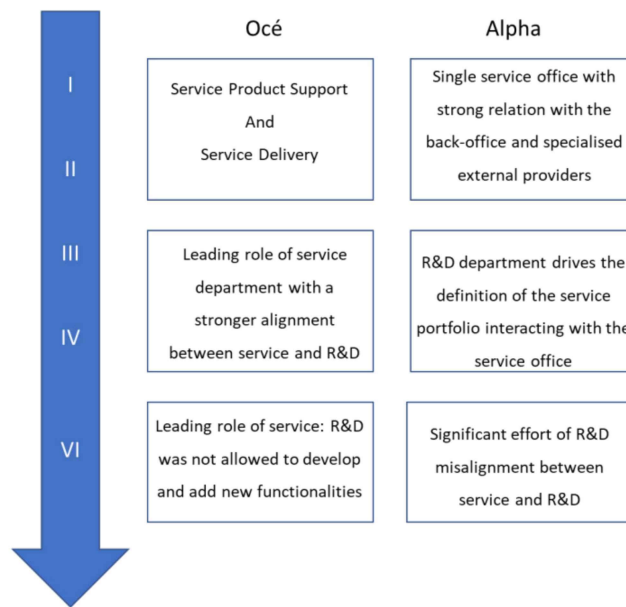

Figure 1: The servitization and digital servitization journeys

In that point in time Océ recognized that it was important to become a system integrator and effectively integrate its own hardware and software modules. The stronger alignment between service and R&D allowed moreover to go further, according to the servitization strategy, R&D was not allowed to make software innovation adding new functionalities without the service engagement.

On the contrary, in the Alpha case, the most important strategy was to build up a proprietary system made of hardware and software modules allowing the back-office to independently and promptly interact with the customer. Currently, the company is providing solutions which allow to configure the product though modularity, both at machinery and software side. These highly customized configurations have been possible through the significant effort of R&D department in the digitalization of the firm, especially regarding the whole production process. Indeed, data collection throughout the assembly of the machinery allows the tracking of all phases, disposing of all the information of the product necessary for the implementation at the customers' site and support. Besides, the service office is not exploiting all the potential provided by the tools developed by the R&D, showing that the latter is pushing the digital servitization trajectory. Furthermore, the R&D department is ongoing in the developing a digital platform for the monitoring of the data exchange between Alpha and its customers, laying the foundation for a shift toward phase VI. However, service

seems to lagging behind, underling a possible misalignment between the service and R&D department.

5. CONCLUSIONS
5.1. Theoretical implications
The analysis opens the debate for the differences in the servitization and digital servitization journey. This distinction is increasing in importance since digital technologies are making the interactions between customer and PSS provider may be more refined and complex. Moreover, the case study confirms that despite the customer interactions remains still a central element, the degree of customer contact is lower (Samson and Chase, 2020). The comparison between the two cases underlined that in a first phase, the two journey overlap. However, when the service modules are commodified thanks to the exploitation of the potential of these technologies, the two journeys strongly differ. Specifically, in the servitization journey the development of a strong and leading service department is crucial. On the other hand, in digital servitization journey, R&D department is the core of service capability development and it is the servitization driver.

5.2. Managerial implications
The paper tries to guide practitioners in the developing of a roadmap for developing servitization and digital servitization trajectories, making clear the complexity of PSS and the different role played by software in the definition of PSSw. Literature recognises PSS as a heterogeneous set of customer solutions, but there is not a scheme for managers, and responsible for developing and operating PSS, describing difficulties and risks through a generic servitization trajectory. This is more complex considering digital servitization as a related but different phenomenon. Furthermore, the findings from this study suggest that the digital servitization relies on the inner competences of the back-office and that exploiting skills related to the manufacturing processes is still important.

5.3. Limitations and further research
The main limitation refers to the fact that the case with qualitative case study research opens issues related to the broader generalizability of the findings from this study. Moreover, we did not go further the exploration of the internal and external service ecosystem of the two explored manufacturers. Specifically, it is interesting to known the role of distributors and suppliers in delivering advanced services. In addition, an interesting point refers to the role played by leadership in the delivery of PSS as modular solutions and the alignment and misalignment between the service and R&D departments. This is an important research line since it can affect the sustainability of digital servitization trajectories.

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APPENDICIES

Appendices here, if required, appendices are included in the 9 page limit.