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The quality of servitization in project-oriented organizations

Purpose - This study examines the criteria for evaluating the quality of servitization and the factors influencing the project-service system's success.

Design/methodology/approach - Evidence was collected through three rounds of Delphi consensus with 42 project managers.

Findings - The results indicate that the quality of servitization in project-oriented organizations is conceptualized as a cumulative construct driven by the product-service system's overall ability to offer more customer value. This value is defined by three interconnected dimensions: the service, the project, and the integration system. The study also proposes a novel customer-oriented quality process with two connected levels comprising eight key factors influencing the quality of the project-service systems and nine key quality criteria that assist in evaluating the project-service systems.

Implications - Offering extra services is crucial for successful project-oriented organizations to deliver more customer value. The value of servitization is the combined value of products and services. The failure of one of these components to satisfy customers leads to the collapse of the whole system, which entails the need for a balanced-focus quality system toward projects and services.

Originality - This study contributes to the quality of servitization in project-oriented organizations, arguing that a balance between service-orientation and project-orientation is preferred to increase customer value and reduce the clash and ambiguity between project-operations and service provision.

Keywords Servitization, Quality management, Project-oriented organizations, Delphi Study

1. Introduction

Servitization has become one of the critical drivers of customer value and product differentiation (Raddats et al., 2019), and project-oriented organizations are no exception. A project-oriented organization is a business organization in which a considerable part of its operations take place in the form of projects (Zighan, 2020). This business model of project-oriented organizations has traditionally been based on delivering value through finished products (Zighan et al., 2021). Many studies highlight the importance of adding services in the context of project-oriented organizations, where servitization occurs (Kujala et al., 2010; Aloini et al., 2013; Galera-Zarco et al., 2014; Zighan et al., 2021). These studies argue that project performance is improved by adopting servitization. For instance, Artto et al. (2008) found that servitization leads to better project functionality and selling based on offering higher

customer value. Galera-Zarco et al. (2014) found that the value in use and the employment of new business models based on servitization lead project-oriented organizations to create new solutions by including services as a crucial part of their offering. Momeni & Martinsuo (2019) argue that servitization becomes the critical success factor of effective sales in project-based organizations. Zighan et al. (2021) contend that servitization is vital development of project-based organizations to support customers' activities and deliver more customer value.

Despite the integrative view of products and services in the context of project-based organizations, it remains unclear how project-based organizations could measure the quality of servitization, which refers to those activities and procedures ensuring that the project will fulfill the purpose for which it was undertaken and that the services will satisfy the needs for which it was added. In the context of project-based organizations, the key quality criteria and factors influencing the quality of servitization are still unclear. Therefore, this paper focuses on the growing implementation of servitization in project-oriented organizations. It contributes to the servitization quality gap, exploring conceptual and empirical concerns in developing a specific quality assessment of servitization in project-oriented organizations. our paper, Mainly attempts to respond to the following questions:

Q1. What criteria evaluate the quality of project-service systems in project-oriented organizations?

Q2. What factors influence the project-service system's ability to create customer value in project-oriented organizations?

In order to consider a deeper dive within the scope of these questions, the Delphi process is adopted to generate a consensus.

Following this introduction, the literature review is presented. This is followed by justifying the selected research methodology. Results are then presented and discussed, with a conclusion covering various aspects of theoretical and managerial implications and future research opportunities.

2. Literature Review

2.1 Servitization

Previous studies have focused on value creation as the central process and core purpose of economic exchanges (Vargo et al., 2008; Chesbrough, et al., 2018). Today, many businesses are moving to a service-focused strategy to create more value, known as servitization (Paiola & Gebauer, 2020). Baines et al. (2009, p. 555) define servitization as "the innovation of an organization's capabilities and processes to better create mutual value through a shift from selling a product to selling product-service systems." Manzini & Vezzoli (2003, p. 855) define the product-service system (PSS) as "An innovation strategy, shifting the business focus from designing (and selling) physical products only, to designing (and selling) a system of products and services which are jointly capable of fulfilling specific client demands." Originally, Vandermerwe & Rada, (1988) introduced the servitization strategy, arguing that more value could be added by adding services to products. Since then, several studies have been developed emphasizing the importance of the service element and advocating the integrative view of products and services (Zighan et al., 2021). It involves developing the capabilities needed to provide services and solution systems that supplement traditional product offerings (Baines et al., 2009). In practice, organizations confront various pathways of servitization to create different levels of customer value (see Oliva & Kallenberg, 2003; Tukker, 2004; Baines et al., 2009; Clayton et al., 2012; Zighan, & Abualqumboz, 2022). This can be achieved in four ways, as shown in figure (1) below.

Product-orientation		Service-orientation	
Integrated-Oriented	Product-Oriented	Service-Oriented	Result-Oriented
Service is offered separately to support product sales	Service is added to support product functionality	Service is incorporated into the product to support customer activities	Service and product are fully integrated into the selling capability

Figure 1: The pathways of servitization (Adapted from Clayton et al., 2012).

Across the world, servitization strategy has become a fundamental business component of the manufacturing sector. For example, several leading multinational corporations, such as General Electric, Caterpillar, IBM Siemens, Rolls Royce, Fujitsu, and Xerox have moved from a having a product-based business model toward a service-oriented business model (Kowalkowski et al., 2017; Kamal et al., 2020). Furthermore, it is established in the literature that moving from a product-orientation to a service-orientation based on servitization can deliver higher customer value (Baines et al., 2009; Lenka et al., 2018). Saunila et al. (2017) defined customer value as the outcome of customer evaluation criteria based on their preferences and needs. Kersten & Koch (2010) maintained that customer value is specific quality attributes that satisfy customers and their expectations. According to Vargo & Lusch (2008), this value is not considered embedded in the product and created by the provider but co-created with customers, and Jang, et al., (2021) argue that the value of servitization is the integrated quality of product and service that offers value in use.

2.2 Servitization in project-oriented organizations

Project-oriented organizations are changing their project activities to add services to their outcomes, in which servitization occurs (Artto et al., 2008; Kujala et al., 2010; Galera-Zarco et al., 2014; Zighan et al., 2018). Therefore, these project-oriented organizations are renovating their business models to add more value by offering services (Brady et al., 2005; Artto et al., 2008; Rabetino, et al., 2021). According to Davies et al. (2007), project-oriented organizations are not merely abandoning selling products and changing into system solution providers. Rather, they adopt different hybrid schemes of integrated products and services. This arrangement's main result is to ensure that the integrated solution and the project operations create value that meets or exceeds customers' expectations (Brady et al., 2005). Aloini et al. (2013), introduce the concept project-service system. Zighan et al. (2018) describe the project-

service system as a system of project components and integrated services that add more value to customers.

However, integrating services into a project is more complicated (Zighan & Abualqumboz, 2022). A project is developed temporarily to achieve a specific objective rather than through continuous manufacturing or service activities (Schultz et al., 2019). The business function through projects also differs from other types of businesses, mainly due to the context adjacent to the project, time and cost constraints, complexity, uncertainty, and value creation characteristics (De Rezende et al., 2018). Moreover, a project is goal-oriented, involving interrelated activities that function interdependently to reach a specific goal (Zighan, 2020). Hence, several factors influence the project's success, and several criteria assess whether the project was successful (Takagi and Varajão, 2022). For instance, Gemino et al. (2021) maintain that meeting the Iron Triangle (i.e., time, budget, and quality) is a critical factor contributing to the project's success. Atkinson (1999) suggested the Square-Route model as project success criteria considering the project information system, organizational benefits, and stakeholders' benefits, in addition to the Iron Triangle, as more balanced and realistic criteria of project success. Varajão et al. (2022) consider the project efficiency and efficacy for project success by combining project management success with product success.

Following the servitization strategy, project-based organizations structure their projects' activities to create more customer value by adding services (Zighan et al., 2021). Thus, a successful product-service system must simultaneously manage two main activities: service provision and project operations (Weeks & du Plessis, 2011; Zighan et al., 2018). Zighan & Abualqumboz (2022) emphasize the role of a dual focus strategy between service provision and project operations. Varajão et al. (2022) defined project operations as the systematic design, direction, and control of the project activities during its lifecycle to achieve the specific

project objectives within its main constraints (i.e., scope, specifications, budget, and schedule). Momeni & Martinsuo (2019) defined service provision as expanding the project value by integrating services to deliver a greater consumer experience. Nevertheless, this requires aligning the success criteria of the project and service provision (Brady et al., 2005).

DeLone and McLean (2016) and Iriarte and Bayona (2020) considered quality a critical success factor impacting projects. While DeLone and McLean (2016) emphasize the technical quality of the projects in terms of success in achieving the project-given goal efficiently. Iriarte and Bayona (2020) contend that project success comes from a set of criteria linked to two dimensions (i) successful project management (such as time, cost, performance, and compliance) and (ii) successful product (such as acceptance, use, appreciation, and customer satisfaction). Tereso et al. (2019) defined project quality as customer acceptance. According to PM2 (EU, 2018), customer acceptance results from a continuous quality evaluation process that starts from project initiation to ensure that it is within the approved specifications and scope and that its expected outputs are within the customer's requirements. This provides a better understanding of relevant quality dimensions for project-oriented organizations looking to integrate products and services is crucial. Additionally, the authors are of the viewpoint that the aspects of "project operation" and "service provision" do tangibly overlap. We believe that they fit together, irrespective of the provider/customer perspective – each provides a similar lens in terms of scope and scale of viewpoint.

2.3 The Quality of Product and Service

Although quality refers to the ability to satisfy customers' needs (Famiyeh et al., 2018), quality remains a vague concept that is difficult to visualize and define (Sama et al., 2021). For instance, Juran (1974) described product quality as the degree of a product's fitness for use. Feigenbaum (1983) identified quality as the total composite characteristics of the product or

services that meet the customer's expectations. Garvin (1987) developed the product quality system, focusing on eight key attributes: anticipated performance, characteristics, conformance, reliability, durability, serviceability, aesthetics, and perceived quality (Table 1).

Please insert Table 1 here

Garvin's understanding includes the traditional notions of conformance and reliability but further places quality in a broader strategic framework. These eight dimensions of quality are decisive for competitive success. Moreover, they are especially helpful in understanding customer expectations regarding product quality (Sebastianelli & Tamimi, 2002).

Product quality measures how well a product will meet the customers' needs, serve its purpose and meet industry standards. In contrast, service quality involves a comparison of expectation with performance (Hallencreutz & Parmler, 2021). Service quality measures how a service will match the customer's expectations (Ghobadian et al., 1994). Parasuraman et al. (1985) argue that five gaps influence customer perceptions of services: management perceptions and consumer expectations; management perceptions and service quality specifications; service quality specifications and service delivery; between service delivery and external communication; and between expected and perceived service. Accordingly, Parasuraman et al. (1985) developed the "SERVQUAL" to control service quality. In the original construction of the SERVQUAL system, Parasuraman et al. (1985) identified ten dimensions to measure service quality: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding customers, and tangibility. Later, Parasuraman et al. (1988) regrouped these ten dimensions into five primary dimensions: reliability, assurance, tangibility, empathy, and responsiveness (Table 2). Those five dimensions are assessed and measured

based on the responses to two general statements: customers' main expectations concerning service and customers' perceptions regarding the levels of service provided.

Please insert Table 2 here

In the context of services, quality is a difficult concept. Cronin and Taylor (1994) distinguish between quality and satisfaction, considering the first as a type of attitude formed from a long-term evaluation, while satisfaction is a specific measure for each transaction (Cronin & Taylor 1994). DeLone and McLean (2016) maintain that the quality of service compares user expectations and perceptions of offered services. Gronroos (1984) developed a quality model under the concept that service quality results from comparing the expected and perceived service. Gronroos's quality model (1984) suggests that service quality consists of technical, functional, and image dimensions. The technical dimension focuses on the type of services provided, the functional dimension focuses on delivering services, and the image dimension focuses on the customer's experience and the perceived value of services.

2.4 A Conceptualization of a Project-Service System Quality

The product-service system is an integrated solution that offers value in use (Baines et al., 2009). According to Peillon et al. (2015), following the servitization strategy, the products and services become one entity. This entity, according to Galbraith (2002), has three main elements: i) the product, referring to the physical good that is produced to meet customer requirements, ii) the service referring to the activities offered to customers based on their desires; iii) the integration system referring to the joint mechanisms used to incorporate product and service into a system. This integration system should increase the value of products and added services through functional configuration supporting product availability and use (Baines and Lightfoot, 2011; Chen, et al., 2022), while profitably contributing to the business (Tenucci & Supino, 2020). Accordingly, to develop a successful product-service system, it is

imperative to align products and services in a system that can meet customer expectations (Raja et al., 2013); since customers' positive or negative experiences would have a fall-out on the product-service system's overall performance (Macdonald et al., 2016; Mert et al., 2014). This, in turn, entails that the product-service system requires modified quality criteria (Macdonald et al., 2016; Raja et al., 2013; Meier et al., 2013; Mert et al., 2014; Erkul et al., 2021). Mert et al. (2014) argue that servitization value is assessed by the quality of the system integrating the products and services and their interdependencies. Likewise, Macdonald et al. (2016) found that the individual quality of products and services and the collective quality of the product-service system are interdependent and interact to create customer value. Thus, the success of servitization requires operational activities supporting the product-service system (Löfberg, 2015).

In practice, project-oriented organizations could offer various product-service systems (i.e., basic services, advanced services, and system solutions) (Rabetino, et al., 2021). Mainly, the project lifecycle phases provide an essential foundation for delivering such services. These phases in the project lifecycle are interrelated and sequential. The outputs of one stage(s) are the inputs for the next one (Artto et al., 2008; Zighan et al., 2018). Artto et al. (2008) identified three phases of servitization: offering services before project-design, offering services during project-implementation, and offering services after project-delivery. Zighan et al. (2018) find that servitization in project-oriented organizations is a process that includes four dimensions; each dimension adds a different value, collectively contributing to the project value. These four dimensions progressively improve the project's competitive priority and shift the project from order-qualifier to order-winner. In this sense, the project offers project and product-orientated services to enhance the order-qualifier characteristics. In addition, customer-oriented service and service-oriented systems must be provided to improve the order-winner features.

This study, therefore, considers that offering related services integrated into a project transforms the project's functionality into "a project-service system." The value resulting from this project and service integration should be supported by quality criteria that help attain the project-service system's goal. In this sense, quality is defined (following the servitization literature) as a product-service system's ability to add more value and satisfy customer's expectations (e.g., Lusch & Vargo, 2006; Macdonald et al., 2016; Raja et al., 2013). Hence, consistent with the perspectives of Garvin (1987), Gronroos (1984), and Parasuraman et al. (1988), we suggest that the criteria of product quality and service quality are the building blocks of servitization quality. The quality of servitization should consider the types of services provided (technical), the process of providing these services (functional), and the outcome of these offered services (image). Conceptually, combining product quality criteria with service quality criteria should produce servitization quality criteria. Table (3) below shows the key quality attributes of product-service quality in the context of project-oriented organizations considering the phases of the project lifecycle, which is developed based on the work of Artto et al. (2008) and Zighan et al. (2018). The framework was used to inform the findings' analysis, informing the authors regarding the current literature's contribution and status. This framework will be developed as the paper progresses.

Please insert Table 3 here

3. Research Methodology

This study adopts the Delphi method to develop the conceptual and empirical issues involved in developing specific quality measurements of servitization in project-oriented organizations. Specifically, these aspects are discussed regarding the potential for servitization to deliver customer value. According to Baines & Shi (2015), the Delphi methodology stimulates the experts' panel to discuss and re-discuss such complex topics iteratively to develop a more reliable and valid model. Hallowell and Gambatese (2009) argue that a Delphi study is formed

between two to six rounds. However, the accuracy of the Delphi study starts dropping after the second round. Worrell et al. (2013) suggest an extra round for validation and consensus-building. Therefore, the target of this study was three rounds of Delphi. It begins by addressing factors identified from a literature review and the secondary data research to achieve two main objectives: incrementally collecting adequate data covering servitization quality dimensions in project-oriented organizations and ensuring that these dimensions are well-developed. This process was carried out in four stages, as indicated below:

- Stage 1 starts with identifying servitization practices from the literature and secondary data analysis, which were thoroughly reviewed to determine the aspects of offering a product-service system in project-oriented organizations.
- Stage 2: Delphi's 1st Round. This round is considered an explorative stage. It was designed to collect generic and broad information regarding service provision activities within the case studies. The practices of offering a product-service system identified from the literature review and the secondary data analysis were discussed with the experts' panel through open-ended questions. In addition, the experts' sought to add or remove some of the servitization quality dimensions.
- Stage 3: Delphi's 2nd Round. This round was designed to collect in-depth information and fill the collected information gaps. Individual interviews were conducted with experts to draw upon or modify their opinions. During this process, both incomplete and ambiguous information was reconstructed.
- Stage 4: Delphi's 3rd Round. This stage was designed to validate and offer a consensus for the identity of servitization quality. A preliminary model of servitization quality was developed in this round, and the experts were asked to validate this model. As a result, some quality aspects were validated in this round, and others were modified or neglected.

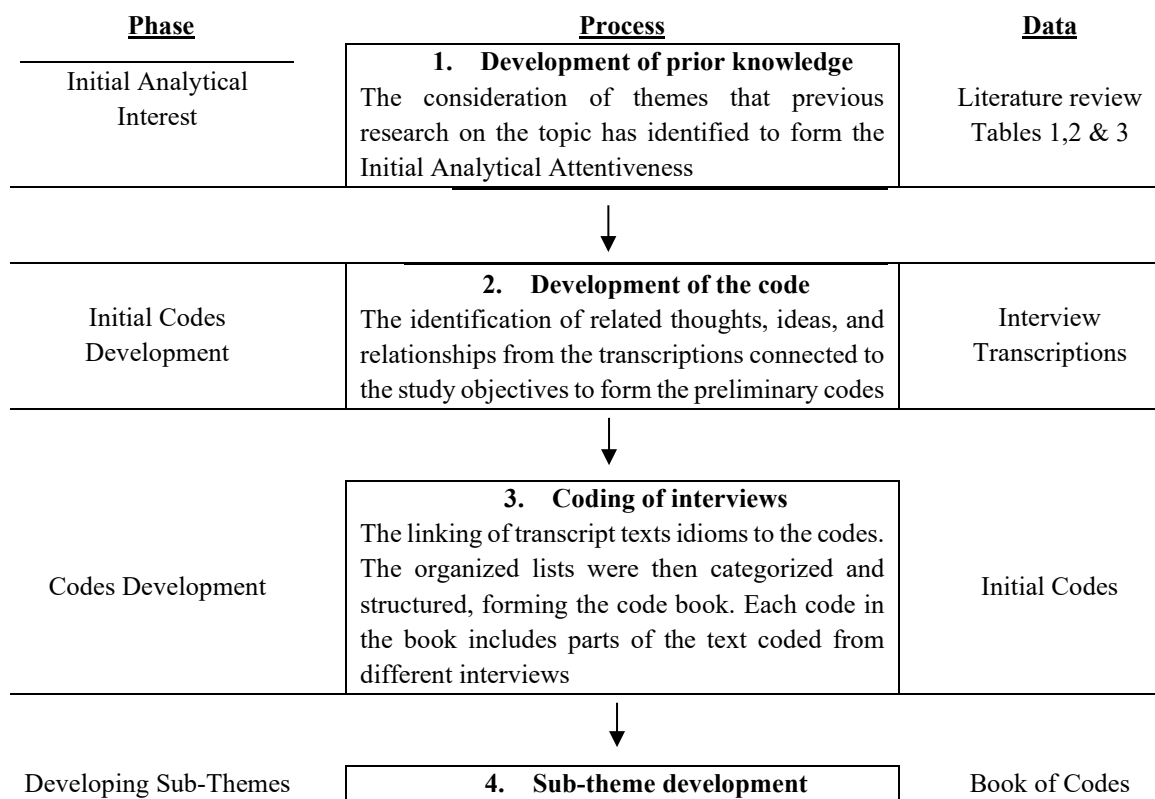
3.1 Data Collection

The empirical evidence is based on data from project-oriented organizations. The experts' selection was a purposive sample from several projects that have successfully offered project-service systems. According to Baines & Shi, (2015), servitization is an ongoing research

phenomenon that has not been well-defined (Baines & Shi, 2015). To help address this therefore, a purposive sampling approach (Sekaran & Bougie, 2016), was adopted for data collection, selecting candidates who could provide sufficient levels of information for the topics being studied. This required the identification of experts having relevant information on servitization (Raddats, et al., 2016; Yeo, et al., 2021; Zighan et al., 2021; Raddats, et al., 2022). Although it is not possible to make statistical inferences from purposive sampling, it has a unique advantage because it reaches people fit to participate in the study based upon their expertise and knowledge of the subject being investigated, and who can provide meaningful responses (Sekaran & Bougie, 2016). As part of our approach LinkedIn was used to establish a diverse expert panel to share their opinions and expectations about servitization quality. To avoid bias and ensure the results were not disproportionate, the researchers carefully defined the study population and the sampling frame, matching this to the target population as much as possible to reduce the risk of sampling bias. Also, reliability criteria for the participants to be qualified as experts were set from the nature of the problem (Baines & Shi, 2015), and no one who met the study criteria was excluded. To be qualified as an expert, the selected individuals were project managers and associated with a project-oriented organization offering project-service systems. Thus, 42 project managers were chosen from 5 different industries, including Construction, Oil & Gas, IT, Logistics, and Health Services. Those project managers were approached to confirm that their companies offer services integrated into the project outcome. The panel of experts was formed with executive managers who have been involved in providing service processes. For instance, the panel of experts includes a Chief Executive Officer, a Chief Financial Officer, an Industrial Investment Director, a Marketing and Sales Director, an Operations and Engineering Director, a Projects Executive Director, Sales Managers, Marketing Managers, Projects Managers, Quality Control Managers, and a Business Development Director.

3.2 Data Analysis

Thematic coding was used to analyze this round, following Braun & Clarke's (2006) analysis approach, where the coding system is both theory and data-driven (see figure 2 below). The recorded data were transcribed and read thoroughly several times to ascertain patterns and initial codes that could arise. The data analysis process went through a question-by-question process until all responses were organized and grouped. Notes and preliminary thoughts were generated, and the data analysis process was initially envisioned. Every answer was read thoroughly to discover the initial codes. Margins were used to note anything interesting or significant and any potential themes that may arise. Next, patterns and initial codes were classified into main codes. Codes were reviewed, expanded, contrasted, changed, and grouped into categories meaningfully expressing the designated codes. Then, the data analysis process was rechecked by tracing the development of the main categories from the beginning. Finally, the identified codes and categories were rechecked via peer review and confirmed through post-round validation.



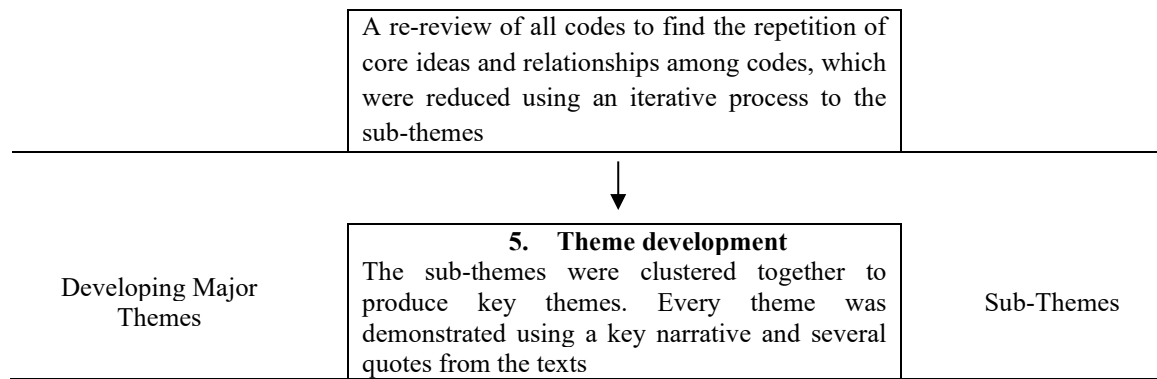


Figure 2: Summary of the coding and clustering process

4. Findings: Interventions

The purpose of the data analysis section is to support adopting a servitization strategy in project-oriented organizations. The data analysis sought to identify those practices that contribute to our understanding of servitization quality in project-oriented organizations. The Delphi study aimed to generate a valid and reliable Servitization Quality Model. The findings section focuses on four primary areas; (1) the drivers of servitization in project-oriented organizations; (2) the characteristics of project-service systems; (3) the key quality criteria, and (4) the critical success factors of a project-service system in project-oriented organizations.

4.1 The Outcome of Delphi's 1st Round

Understanding the reasons behind offering services in a project-oriented organization helped in developing a measurable servitization quality. Therefore, the first round was designed to elicit experts' construal of servitization in project-oriented organizations by exploring the drivers of servitization and the characteristics of project-service systems. During this stage, the frequency criterion is used to measure and allocate the importance of coding and improve the data analysis reliability and findings' trustworthiness.

The data analysis projected the panelists' thoughts concerning the context of servitization. The majority of experts considered adding services as a crucial market value proposition. The data analysis process yielded 125 traits as initial codes. These initial codes were disaggregated

into six categories. Table 4 describes these codes, supported with quotes from the study's participants.

Please insert Table 4 here

The findings focused on providing extra services bundled into the project activities. Yet, there are different types and forms of added services. Table 5 below offers some examples of offered product-service systems in those industries

Please insert Table 5 here

The constellation of characteristics inherent in a service offering occurs during its development. Hence, it is essential to be aware of certain crucial elements in creating a successful service package. Therefore, experts were asked about factors influencing the types of services offered and the unique characteristics of service-project systems. The data analysis yielded 143 initial aspects, which were disaggregated within nine principal codes. Table 6 below describes these codes according to the study's participants.

Please insert Table 6 here

4.2 The Outcome of Delphi's 2nd Round

The second round was to understand the key quality factors influencing the success of project-service systems. The experts point out that servitization critical success factors should involve dimensions related to offered service and project operations. Furthermore, these offered services should fit with the project deliverable. The following quote represents some of the recurrent and main themes, "*It is important to have a design of a cohesive project-service system around customers' needs and requirements to ensure that it will deliver both the tangible value of the project and the intangible value of the services.*" According to the respondents, a firm must provide balanced attention to service-orientation and project-efficient

operations. They affirm that these attributes are fundamental when adding services to the project. The data analysis produced several factors influencing the quality of project-service systems, which were coded into eight main categories. Table (7) below provides the meaning of each of these key factors, as explained by the respondents.

Please insert Table 7 here

4.3 The Outcome of Delphi's 3rd Round

Intending to ensure that the project-service system will fulfill its purpose and that the services will satisfy the needs it was added, the eight key factors identified above were subjected to further detailed investigation focusing on developing the key quality criteria that assist in evaluating servitization in project-oriented organizations. It has been found that servitization quality is the customer's overall impression of the project-service system. There is an indispensable relationship between customer-orientation based on service and project-operations. The following quote represents some of the recurrent and central themes that the different respondents have analyzed: *"the quality system for offering services integrated into the project is a system of project and services components that operate synchronously and work consistently... We must ensure that the product-service system and its components are high quality. Thus, the quality system should involve criteria related to both project and services"*.

The data analysis identified nine key quality criteria that assist in evaluating the project-service systems to ensure the degree to which customer requirements have been met during the project lifecycle. These criteria are described in table 8 below.

Please insert Table 8 here

According to the findings, a project-service system's value is evaluated at an aggregate level that consists of three main dimensions: project deliverables, services, and the integration system. Therefore, combining the project and related services into a system should guarantee

a coherent performance and fulfill customer requirements. Figure 3 below illustrates the quality process of the project-service system through the project lifecycle. It shows that the quality of servitization depends on how customer expectations are matched by the project-service system, which is completed and extended over the project's entire lifecycle based on various product-related services.

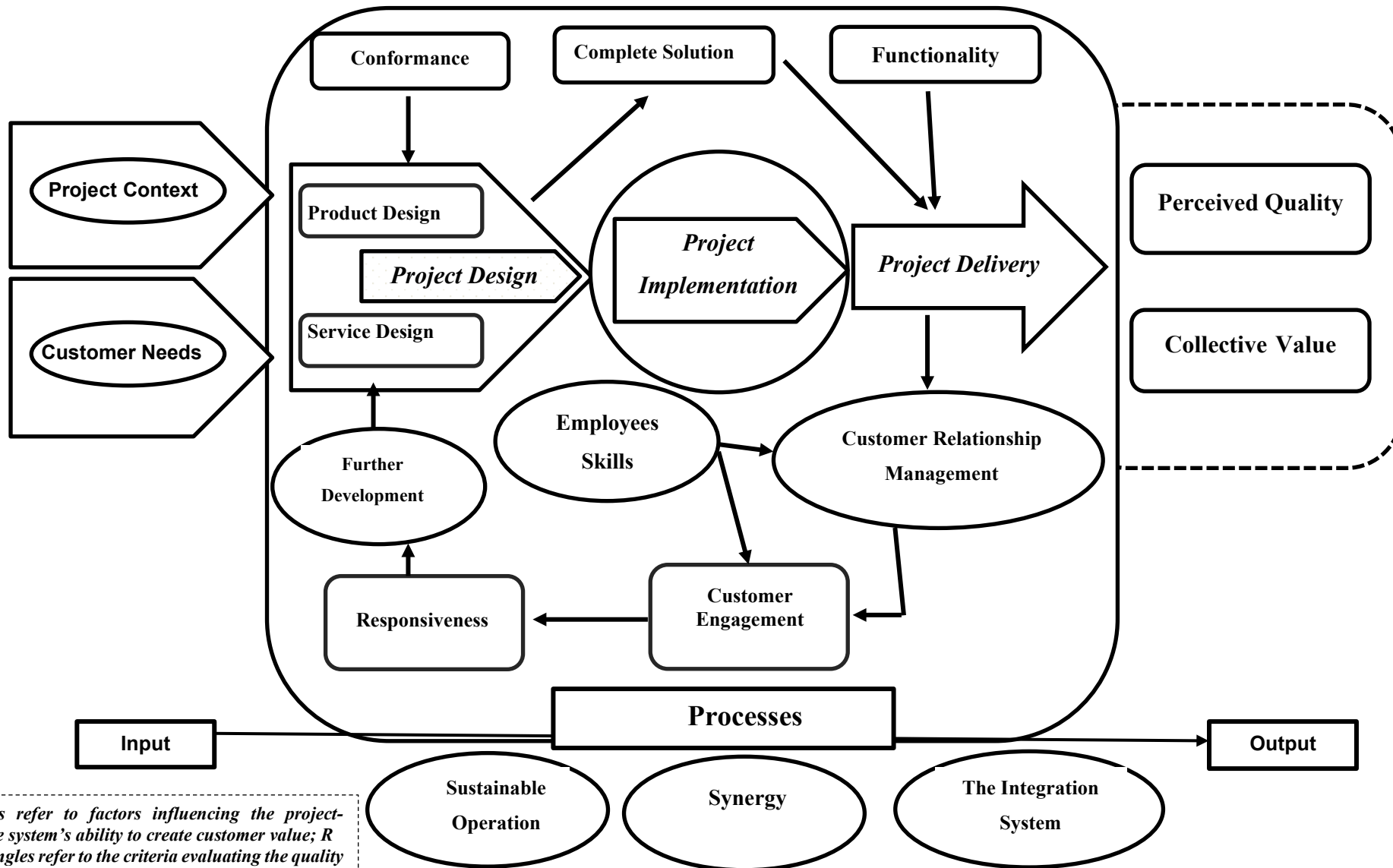


Figure 3: The Quality Process of Project-Service System

In the first stage, some factors should be considered at the beginning of the project to ensure meeting the targeted quality level. These factors include the project context and customer needs. The project context concerns the project characteristics (i.e., an endeavor effort planned to achieve a particular goal and produce a one-off product within three main constraints (scope, cost, and time)). The customer need is considered an opportunity to add more value by adding more services related to customer needs. In the project design stage, the project's interaction with customers and understanding of their needs should be considered, which will influence the required added services. In the second stage, which includes project design, implementation, and delivery, the project manager should identify the product-service system's attributes and metrics while starting with the "product design" and the "service design". The added services should be aligned with the designated markets and are compatible with the project's activities, operations, and outcomes. Here the level of conformance to the designed specifications indicated by customers is taken into consideration, as the project's nature and specifications. The complete solution is the primary outcome of the project-service system design. Throughout the implementation process, sustainable operation synergy and the integration system are the critical success factors of the project-service systems focusing on a sustainable project operation to maximize the project outcomes and create a collaborative environment between the project operation and the offered services.

Nevertheless, offering services means more customer involvement and touchpoints. The project team should make fast-decision, solve problems effectively, oversee resources, balance priorities, and track progress toward goals. At the final stage, the project will be delivered, and customers will compare the project attributes with their needs and requirements, making their impressions about the product functionality and the perceived quality, which will be shaped as an output. Here, the collective value represents the output of the projects and the added services

and their interaction, affecting customer perceived quality. The delivery stage will form the feedback system for further development and improvement.

5. Discussion

This research offers a generic instrument for assessing a project-service system's quality across project-oriented organizations. We propose that offering extra services becomes crucial for successful project-oriented organizations to deliver more customer value. It provides customers with more flexibility and value and improves customer satisfaction. Once services are provided, a project-oriented organization appears to abandon the idea that the project value is only placed on the delivery phase. However, this project-service system is not without challenges. The project is goal-oriented, an endeavor effort planned to achieve a particular goal and produce a unique one-off product within three main constraints (scope, cost, and time) (Zighan, 2020). According to Gemino et al. (2021), project management's main critical success factor is achieving the project goal within these constraints. Nevertheless, Atkinson (1999) argued that more balanced and realistic criteria for a project's success should be considered in assessing the project quality in addition to the Iron Triangle. Likewise, Varajão et al. (2022) argued that the project success criteria should include additional factors focusing on leveraging and maximizing the project stakeholders' expected value.

Weeks & du Plessis (2011) argue that in projects where servitization is implemented, it leads project-oriented organizations towards facing two central dichotomies; i) satisfying customers' needs through adding services and ii) fulfilling the project requirements within the intended time, cost, and resource boundaries. According to Zighan et al. (2018), the implementation of the servitization process should enable better project planning, avoid contradictions, and provide technical and quality viability with less uncertainty. Moreover, the resulting project outcomes may fail without clearly defining how the project's success will be evaluated (Varajão

et al., 2022). Thus, moving to a project-service system requires different success factors and quality criteria.

Based on our findings, the misalignment between the product's operation process and the service operation process in project-oriented organizations may prohibit the organizations' ability to effectively design a successful integrated system or inhibit their ability to respond to customers' needs effectively. Here, the main challenge is to satisfy customers through exceptional performance (cf. Martinez et al., 2010; Smith et al., 2014). Zighan & Abualqumboz (2022) contend that customers will not be satisfied without considering several success factors, including the success of the project operations. According to Macdonald et al. (2016), an organization achieves quality by consistently meeting its customers' needs. The individual quality of product and service and the collective quality of a product-service system are interdependent, where they interact to create customer value. Therefore, the product-service system should increase the value of both the product and the service (Baines & Lightfoot, 2011).

The present research found that the quality of servitization is driven by the customer's cumulative satisfaction with the product-service system. It suggests that the value of servitization should combine the features of the project and the added services, whereby the tangible and intangible characteristics must be considered. The project-services systems should be controlled based on integrated metrics that reflect the outcomes of both products and services. Rapaccini (2015) confirms that the value of servitization comes from the successful combination of products and services as one component (Beverly et al., 2002; Baines et al., 2009b; Meier et al., 2013; Mert et al., 2014). The integration system should exploit the synergy between product and service and offer higher customer value. Both project and service are interdependent, as evidenced by the findings, and neither service nor project can be disregarded

without one affecting the other. Therefore, the success of servitization is described by three interrelated aspects. These aspects relate to i) the service dimension, ii) the product dimension, and iii) the integration system.

Several initiatives related to these three aspects appear to contribute correspondingly to the value of servitization in project-oriented organizations. As a result, the servitization quality is assessed based on sustainable cooperation between project operations and service provision. These factors characterize the quality of the project-service system that could satisfy customers and meet their expectations. Thus, we suggest that the quality of the project-service system involves success factors (Table 7) and success criteria (Table 8). Figure 4 presents the quality process of the project-service system, considering the success factors and criteria of servitization during the project lifecycle. This quality process assesses the entire system and its different aspects (i.e., project, service, and the integrating system). A defined set of interrelated quality criteria related to project, service, and integration are responsible for delivering high-quality project-service systems and influencing the system's ability to create value. These include, for instance: conformance, functionality, performance, synergy, convenience, and continuous development that form the system's collective value and influence the system's perceived quality. Nevertheless, the value of servitization requires distinctive arrangements that can impact project-oriented organizations' operations processes. Therefore, several factors that influence the success of servitization in a project-based arena should be considered. For instance, the integration system integrates the services into the project considering the synergy effect to increase value and the project's sustainable operation, considering that the value of the project and service are interdependent.

As a result of the proposed quality of servitization, the project has a high potential to provide more effective and complete solutions that ultimately favor the customer. This is in line with

previous studies (cf. Brady et al., 2005; Galbraith, 2002; Baines & Lightfoot, 2011; Rapaccini, 2015). For instance, Rapaccini (2015) confirms that the value of servitization comes from the successful combination of products and services as one component. Baines and Lightfoot (2011) argue that the integration system should consider product and service features and their interdependent relationships. Alghisi & Saccani (2015) argue that primary alignment directions are needed to offer a product-service system successfully. These alignment directions concern customers with servitization strategic orientation and internal organizational aspects. Moreover, the operational activities of servitization are required to be consistent with the product-operations and the service-orientation to deliver a high-quality outcome to customers (cf. Davies et al., 2007, Brady et al., 2005; Alghisi & Saccani, 2015).

Moreover, customers are the main driver for servitization and the key players in service design and delivery (Meier et al., 2013; Mert et al., 2014). Offering services links people with the system increasing customer involvement and customer touchpoints, necessitating an operative alignment of service and the product's operational system. Thus, the project-service system should ensure the customer easy access to the touchpoints. It should also be run by employees with personal skills and service in mind.

6. Conclusion

This paper examines critical conceptual and empirical quality criteria that can be considered in measuring servitization value. It argues that project and service complement each other. The value of servitization is the combined value of products and services. The failure of one of these components to satisfy customers leads to the collapse of the whole system. This study argues that a balanced-focus quality system oriented toward projects and services is needed to avoid this failure. Consequently, offering services in project-oriented organizations must be developed based on sustainable project operations and service provision cooperation. Three

interrelated aspects describe the success of servitization. These aspects relate to i) the service dimension, ii) the product dimension, and iii) the integration system. Several initiatives related to these three aspects appear to contribute correspondingly to the value of servitization in project-oriented organizations. Therefore, servitization requires integrating project quality and service quality measures and considers extra quality measurement for the integrating system.

Accordingly, the proposed quality of servitization consists of two connected levels. The first level involves the project and its objectives, the services provided, and the integration system. Project quality is concerned with project operations, mainly with the project design, implementation, and operations process. It focuses on the standards, compliance, and specifications that have been agreed-upon. Service quality is concerned with understanding the customer's needs, managing relationships with the customer, refining the customer's journey and experience, and meeting the customer's expectations. Also, the integration system should improve synergy by integrating the services into the project's activities and adding more value to its customers. The second level is the complete system resulting from adding service to the project to offer a complete solution. It is concerned with the quality of servitization as driven by the customer's cumulative satisfaction with the project-service system. As a result, the servitization quality is assessed based on sustainable cooperation between project operations and service provision. These factors influence the quality of the project-service system that could satisfy customers and meet their expectations. These interlinked entities have imperative implications for managerial practices that enable adequate service provision in project-oriented organizations.

6.1 Theoretical Implications

This paper makes an incremental and revelatory contribution around key outputs and implications aligned to the developed themes. It contributes to the servitization literature in the

context of project management. The principal contribution of this study is a series of propositions represented collectively by the project-services system quality. A project-service system tends to focus either on product or service dimensions, ignoring the project-service system's contextual influences. This study argues that within the servitization context, it is not the aspects of products or services that are important. Instead, it is how they can be aligned to lead to an integrated offering that meets customer needs and expectations.

6.2 Practical Implications

The study's findings indicate that offering extra services is crucial for successful project-oriented organizations to deliver more customer value. Perhaps the most important practical implication relates to the relative value of the projects—the service system targeted the system as a whole. Managers should adopt quality criteria to manage the system details and consider the project-service system's big picture. It is more effective when providing a higher value to the customer. Both services and product features must be considered when designing an operative and functional product and service system quality. This quality system must be balanced, adaptable, and orientated toward customers. Based on this, organizations should acknowledge customer expectations and strive to surpass these expectations through operational project-service systems. Finally, the study provides a platform on which further research of servitization quality could be carried out. To extend the understanding further, we propose a similar approach to studying how adopting a project-service system could fail.

References

- Alghisi, A., & Saccani, N. (2015). Internal and external alignment in the servitization journey—overcoming the challenges. *Production Planning & Control*, 26(14-15), 1219-1232.
- Aloini, D., Dulmin, R., Mininno, V., & Ponticelli, S. (2013). Project-service solutions in the yacht industry: A value-chain analysis. *International Journal of Engineering Business Management*, 5(Godište 2013), 5-52.

- Artto, K., Wikström, K., Hellström, M., & Kujala, J. (2008). Impact of services on project business. *International Journal of Project Management*, 26(5), 497-508.
- Atkinson, R. (1999). Project management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *International journal of project management*, 17(6), 337-342.
- Baines, T. & Lightfoot, H. (2011). Towards an Operations Strategy for the Infusion of Product-Centric Services into Manufacturing, In: Service System Implementation, H. Demirkan, J. C. Spohrer, Krishna V. (Eds.), pp. 89-111, Springer, New York, NY, USA
- Baines, T. (2015). Exploring service innovation and the servitization of the manufacturing firm. *Research-Technology Management*. Vol.58, Issue 5, p9-11
- Baines, T. and Shi, V. G. (2015). A Delphi study to explore the adoption of servitization in UK companies. *Production Planning & Control*: 1-17.
- Baines, T. S., Lightfoot, H. W., Benedettini, O., & Kay, J. M. (2009). The servitization of manufacturing: a review of literature and reflection on future challenges. *Journal of Manufacturing Technology Management*, 20(5), 547-567.
- Brady, T., Davies, A., & Gann, D. M. (2005). Creating value by delivering integrated solutions. *International Journal of Project Management*, 23(5), 360-365.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.
- Chen, K. L., Lassen, A., Li, C., & Møller, C. (2022). Exploring the value of IoT data as an enabler of the transformation towards servitization: an action design research approach. *European Journal of Information Systems*, 1-27.
- Chesbrough, H., Lettl, C., & Ritter, T. (2018). Value creation and value capture in open innovation. *Journal of Product Innovation Management*, 35(6), 930-938.
- Cronin Jr, J., & Taylor, S. A. (1994). SERVPERF versus SERVQUAL: reconciling performance-based and perceptions-minus-expectations measurement of service quality. *Journal of marketing*, 58(1), 125-131.
- Davies, A., Brady, T., & Hobday, M. (2007). Organizing for solutions: Systems seller vs. systems integrator. *Industrial marketing management*, 36(2), 183-193.
- De Rezende, L. B., Blackwell, P., & Pessanha Goncalves, M. D. (2018). Research focuses, trends, and major findings on project complexity: A bibliometric network analysis of 50 years of project complexity research. *Project management journal*, 49(1), 42-56.
- DeLone, W. H., & McLean, E. R. (2016). Information systems success measurement. *Foundations and Trends® in Information Systems*, 2(1), 1-116.
- Erkul, M., Chakraborty, S., & Kaynak, H. (2021). The strategic value of servitization: A quality management perspective. *Quality Management Journal*, 28(4), 176-189.
- EU (2018), The PM2 Project Management Methodology Guide 3.0, European Union, Luxembourg
- Famiyeh, S., Asante-Darko, D., & Kwarteng, A. (2018). Service quality, customer satisfaction, and loyalty in the banking sector: The moderating role of organizational culture. *International Journal of Quality & Reliability Management*. Vol. 35 No. 8, pp. 1546-1567.
- Feigenbaum, A. V. (1983). *Quality control* (3rd ed.). New York: McGraw-Hill.

- Galbraith, J.R. (2002). Organizing to deliver solutions. *Organizational Dynamics*, Vol. 31 No. 2, pp. 194-207.
- Galera-Zarco, C., Morales-Gallego, M., & Pérez-Aróstegui, M. N. (2014). Servitization in Project-Based Firms. *Strategic Change*, 23(5-6), 329-340
- Garvin, D.A. (1987). Competing on the eight dimensions of quality. *Harvard Business Review*, Vol. 65 No. 6, pp. 101-109.
- Gebauer, H., Ren, G. J., Valtakoski, A., & Reynoso, J. (2012). Service-driven manufacturing: provision, evolution, and financial impact of services in industrial firms. *Journal of Service Management*, 23(1), 120-136
- Gemino, A., Horner Reich, B., & Serrador, P. M. (2021). Agile, traditional, and hybrid approaches to project success: is hybrid a poor second choice?. *Project Management Journal*, 52(2), 161-175.
- Ghobadian, A., Speller, S. and Jones, M. (1994), "Service Quality: Concepts and Models", *International Journal of Quality & Reliability Management*, Vol. 11 No. 9, pp. 43-66.
- Godlevskaja, O., van Iwaarden, J. and van der Wiele, T. (2011), "Moving from product-based to service-based business strategies: Services categorisation schemes for the automotive industry", *International Journal of Quality & Reliability Management*, Vol. 28 No. 1, pp. 62-94.
- Gronroos, C. (1984). A service quality model and its marketing implications. *European Journal of Marketing*. Vol. 18, no. 4, 36-44
- Hallencreutz, J., & Parmler, J. (2021). Important drivers for customer satisfaction—from product focus to image and service quality. *Total quality management & business excellence*, 32(5-6), 501-510.
- Hallowell, M. R., & Gambatese, J. A. (2009). Qualitative research: Application of the Delphi method to CEM research. *Journal of construction engineering and management*, 136(1), 99-107.
- Iriarte, C., & Bayona, S. (2020). IT projects success factors: a literature review. *International Journal of Information Systems and Project Management*, 8(2), 49-78.
- Jang, K. K., Bae, J., & Kim, K. H. (2021). Servitization experience measurement and the effect of servitization experience on brand resonance and customer retention. *Journal of Business Research*, 130, 384-397.
- Juran, J. M. (1974). Basic concepts. *Quality control handbook*, 2-1.
- Kamal, M. M., Sivarajah, U., Bigdeli, A. Z., Missi, F., & Koliousis, Y. (2020). Servitization implementation in the manufacturing organisations: Classification of strategies, definitions, benefits and challenges. *International Journal of Information Management*, 55, 102206.
- Kersten, W. and Koch, J. (2010), "The effect of quality management on the service quality and business success of logistics service providers", *International Journal of Quality & Reliability Management*, Vol. 27 No. 2, pp. 185-200.
- Kowalkowski, C., Gebauer, H., Kamp, B., & Parry, G. (2017). Servitization and deservitization: Overview, concepts, and definitions. *Industrial Marketing Management*, 60, 4-10.

- Kowalkowski, C., Gebauer, H., Kamp, B., & Parry, G. (2017). Servitization and deservitization: Overview, concepts, and definitions. *Industrial Marketing Management*, Vol.60, p. 4-10.
- Kujala, S., Artto, K., Aaltonen, P., & Turkulainen, V. (2010). Business models in project-based firms—Towards a typology of solution-specific business models. *International Journal of Project Management*, 28(2), 96-106.
- Lenka, S., Parida, V., Sjödin, D. R., & Wincent, J. (2018). Towards a multi-level servitization framework: Conceptualizing ambivalence in manufacturing firms. *International Journal of Operations & Production Management*. Vol. 38 No. 3, pp. 810-827.
- Löfberg, N., Witell, L., & Gustafsson, A. (2015). Service manoeuvres to overcome challenges of servitization in a value network. *Production Planning & Control*, 26(14-15), 1188-1197.
- Lusch, R. F., & Vargo, S. L. (2006). Service-dominant logic: reactions, reflections and refinements. *Marketing theory*, 6(3), 281-288.
- Macdonald, E. K., Kleinaltenkamp, M., & Wilson, H. N. (2016). How Business Customers Judge Solutions: Solution Quality and Value in Use. *Journal of Marketing*, 80(3), 96-120.
- Manzini, E., & Vezzoli, C. (2003). A strategic design approach to develop sustainable product service systems: examples taken from the 'environmentally friendly innovation' Italian prize. *Journal of cleaner production*, 11(8), 851-857.
- Martinez, V. , Bastl, M. , Kingston, J. Evans, S. (2010). Challenges in transforming manufacturing organizations into product-service providers. *Journal of Manufacturing Technology Management*, Vol. 21 Iss: 4, pp.449 - 469
- Meier, H., Uhlmann, E., Raue, N., & Dorka, T. (2013). Agile Scheduling and Control for Industrial Product-Service Systems. *Procedia CIRP*, 12, 330-335.
- Mert, G., Waltemode, S., & Aurich, J. C. (2014). Quality Assessment of technical Product-Service Systems in the Machine Tool Industry. *Procedia CIRP*, 16, 253-258
- Momeni, K., & Martinsuo, M. (2019). Integrating services into solution offerings in the sales work of project-based firms. *International Journal of Project Management*, 37(8), 956-967.
- Oliva, R., & Kallenberg, R. (2003). Managing the transition from products to services. *International journal of service industry management*. Vol. 14 No. 2, pp. 160-172.
- Paiola, M., & Gebauer, H. (2020). Internet of things technologies, digital servitization and business model innovation in BtoB manufacturing firms. *Industrial Marketing Management*.
- Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *The Journal of Marketing*, 41-50.
- Parasuraman, A., Zeithaml, V.A., & Berry, L.L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64(1), 12-40.
- Peillon, S., Pellegrin, C., & Burlat, P. (2015). Exploring the servitization path: a conceptual framework and a case study from the capital goods industry. *Production Planning & Control*, 26(14-15), 1264-1277.
- Rabetino, R., Kohtamäki, M., Brax, S. A., & Sihvonen, J. (2021). The tribes in the field of servitization: Discovering latent streams across 30 years of research. *Industrial Marketing Management*, 95, 70-84.

- Raddats, C., Baines, T., Burton, J., Story, V. M., & Zolkiewski, J. (2016). Motivations for servitization: the impact of product complexity. *International Journal of Operations & Production Management*. Vol. 36 No. 5, pp. 572-591.
- Raddats, C., Kowalkowski, C., Benedettini, O., Burton, J., & Gebauer, H. (2019). Servitization: A contemporary thematic review of four major research streams. *Industrial Marketing Management*, 83, 207-223.
- Raddats, C., Naik, P., & Bigdeli, A. Z. (2022). Creating value in servitization through digital service innovations. *Industrial Marketing Management*, 104, 1-13.
- Raja, J. Z., Bourne, D., Goffin, K., Çakkol, M., & Martinez, V. (2013). Achieving customer satisfaction through integrated products and services: An exploratory study. *Journal of Product Innovation Management*, 30(6), 1128-1144.
- Rapaccini, M. (2015). Pricing strategies of service offerings in manufacturing companies: a literature review and empirical investigation. *Production Planning & Control*, (ahead-of-print), 1-17.
- Sama, H. R., Gupta, S., Mathew, M., & Gupta, S. (2021). Comparative analysis of service quality of Big Bazaar and Spencer's: a fuzzy approach. *International Journal of Quality & Reliability Management*. Vol. 38 No. 10, pp. 1993-2006.
- Saunila, M., Rantala, T., Ukko, J. and Pekkola, S. (2017), "Gaining insights into the measurement of value in industrial service network", *International Journal of Quality & Reliability Management*, Vol. 34 No. 4, pp. 478-493.
- Schultz, C., Graw, J., Salomo, S., & Kock, A. (2019). How Project Management and Top Management Involvement Affect the Innovativeness of Professional Service Organizations—An Empirical Study on Hospitals. *Project Management Journal*, 50(4), 460-475.
- Sebastianelli, R., & Tamimi, N. (2002). How product quality dimensions relate to defining quality. *International Journal of Quality & Reliability Management*. Vol. 19 No. 4, pp. 442-453.
- Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach*. John Wiley & Sons.
- Smith, L., Maull, R., & CL Ng, I. (2014). Servitization and operations management: a service dominant-logic approach. *International Journal of Operations & Production Management*, 34(2), 242-269.
- Takagi, N., & Varajão, J. (2022). ISO 21500 and success management: an integrated model for project management. *International Journal of Quality & Reliability Management*. Vol. 39 No. 2, pp. 408-427
- Tenucci, A., & Supino, E. (2020). Exploring the relationship between product-service system and profitability. *Journal of management and governance*, 24(3), 563-585.
- Tereso, A., Ribeiro, P., Fernandes, G., Loureiro, I., & Ferreira, M. (2019). Project management practices in private organizations. *Project Management Journal*, 50(1), 6-22.
- Tukker, A. (2004). Eight types of product–service system: eight ways to sustainability? Experiences from SusProNet. *Business strategy and the environment*, 13(4), 246-260.
- Vandermerwe, Sandra, and Juan Rada (1988). Servitization of business: adding value by adding services. *European management journal* 6, no. 4, 314-324.

- Varajão, J., Magalhães, L., Freitas, L., & Rocha, P. (2022). Success Management–From theory to practice. *International Journal of Project Management*. Volume 40, Issue 5, July 2022, Pages 481-498
- Vargo, S. L., & Lusch, R. F. (2008). Service-dominant logic: continuing the evolution. *Journal of the Academy of marketing Science*, 36(1), 1-10.
- Vargo, S. L., Maglio, P. P., & Akaka, M. A. (2008). On value and value co-creation: A service systems and service logic perspective. *European management journal*, 26(3), 145-152.
- Weeks, R. V., & du Plessis, J. W. (2011). Servitization: Developing a business model to translate corporate strategy into strategic projects. In *Technology Management in the Energy Smart World (PICMET), 2011 Proceedings of PICMET'11*: (pp. 1-10). IEEE.
- Worrell, J. L., Di Gangi, P. M., & Bush, A. A. (2013). Exploring the use of the Delphi method in accounting information systems research. *International Journal of Accounting Information Systems*, 14(3), 193-208.
- Yeo, S. F., Tan, C. L., Teo, S. L., & Tan, K. H. (2021). The role of food apps servitization on repurchase intention: A study of FoodPanda. *International Journal of Production Economics*, 234, 108063.
- Zighan, S (2020). Motivational paradox: A Delphi study to reach a consensus knowledge regarding individual vs. team motivation in the context of project-based organizations. *International Journal of Project Organisation and Management*. .12(3), 240-259
- Zighan, S., & Abualqumboz, M. (2022). Dual focus: service-product orientation to manage the change paradox following servitization strategy. *Service Business*, 16(1), 29-55.
- Zighan, S., & Abualqumboz, M. (2022). Dual focus: service-product orientation to manage the change paradox following servitization strategy. *Service Business*, 16(1), 29-55.
- Zighan, S., Alkalha, Z., Bamford, D., Reid, I., & Zu'bi, M. F. (2021). Servitisation through structural adaptation. *Journal of Service Theory and Practice*.
- Zighan, S., Bamford, D., & Reid, I. (2018). From Order-Qualifier to Order-Winner? Servitization Value Chain and the real estate development projects. *Journal of Modern Project Management*, 6(2), 131-149.