

UDC: 338.462; 339.138

JEL: O31; O33; M31

## SERVITIZATION IN THE DIGITAL AGE: A SYSTEMATIC REVIEW

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**For citation:** Sharko E. R., Rebiazina V. A. 2023. Servitization in the digital age: A systematic review. *Vestnik of Saint Petersburg University. Management* 22 (4): 476–493.  
<https://doi.org/10.21638/11701/spbu08.2023.402>

With the growth of digitalisation, more forms of innovative activity of companies emerge; it increases the interest of researchers to the relevance of introducing the concept of servitization in business functioning in an online environment. The problem is in a fragmentary nature of the existing studies since no general definition of the phenomenon of “servitization” has been formed yet. The purpose of this study is to perform a systematic review of articles from various databases, to overview the existing approaches to determining the role of servitization in the PSS model and to formulate the authors’ definition of this concept. In this study, we identified a common array of existing articles on servitization (1 659 conceptual, meta-analytical and empirical) from the databases of Scopus, Web of Science and Emerald Insight, which were analysed according to different criteria for inclusion or exclusion from the final pool of articles resulting in 24 papers selected for the detailed analysis. The results include the developed own definition of servitization, as well as the identification of four basic approaches to this concept. The author’s contribution to the development of the theory of servitization is strengthening of the focus on the role of servitization in the Production — Service — Solution model. The introduction of the concept of servitization improves the innovative activity of companies presenting their product in the digital environment. Thus, based on further studies of the properties and characteristics of servitization, effective decision-making models for doing business in the digital economy can be formed.

*Keywords:* servitization, digital economy, innovation, PSS-model, market orientation, product, service, solution.

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This research has been conducted within the fundamental research project 2022.002R Rebiazina V. A. “Consumer trust as an institutional factor of the Russian digital economy development” as a part of the HSE Graduate School of Business Research Program in 2022–2024.

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## INTRODUCTION

In the age of digitalization, every company has faced the problem of “transferring” all business processes to an online format, with the exception of the actual release of the product (goods and services). Researching consumer preferences and organizing of sales processes is also necessary. Thus, the name of these processes appeared as “servitization”. All reviews on servitization are conditionally divided into (both variants are possible: “serviSization\*” and “serviTization\*”):

- 1) adding a service to a product. The first publications referred to [Vandermerwe, Rada, 1988]; the Product-Solution System [Zhang, Banerji, 2017; Raddats et al., 2019; Kamal et al., 2020; Paschou et al., 2020];
- 2) an innovative concept of improving a business model by building it in a Product — Service — Solution bundle (product — papers observe both digital and industrial products; service — papers observe both digital and ordinary services; solution — papers observe both digital solutions and platforms; Product — Service — Solution papers observe sense and role PSS-model) for online business [Martin-Pen, Pinillos, Reyes, 2017; Wang, Lai, Shou, 2018; Guarcello, De Vargas, 2020; Rondi, De Massis, Kraus, 2021].

In general, various servitization structures exist, depending on the profile of the business, as well as on the chosen and implemented strategy in each company. Choosing a particular company structure, algorithms and mechanisms for the implementation of servitization in practice are determined by the business owners and management [Tan et al., 2019].

On the one hand, servitization includes the process of buying and selling goods and services, using modern communication technologies including the Internet (technological solutions). The success of such transactions largely depends on the quality of this process: all participants get what they want, and the newly-formed connections between the elements of the process accumulate the company’s experience in implementing the preferred strategy in the digital environment. Therefore, the level of quality of the process of servitization between enterprises in developing countries differs from developed countries, since the former still experience shortcomings in terms of infrastructure, finance, legislation and other factors necessary for the development of e-commerce in the digital environment [Huang et al., 2019]. In this sense, the analysis of servitization, from the perspective of the Product — Service — Solution model (PSS-model) is important to ensure an effective process in business.

On the other hand, servitization has an impact on the market orientation (it considers the preferences and desires of consumers), on the innovativeness of the company (the ability to develop and produce new innovative products), and on its economic performance (the more services and solutions the company offers, the higher its income) [Lin et al., 2019]. The essence of servitization, according to the triad “Market Orientation — Performance — Innovation” is insufficiently represented in the existing literature, although the relevance of such a study is obvious and requires deeper analysis.

The problem remains that more digitalization increases the variety of innovative activities on the market, but all of them follow the servitization concept. Numerous scientists are still trying to highlight the core of servitization: whether this is the reason for, or consequence of digitalization, or the process that conveyed innovation to a new digital level. In fact, the study of the properties of servitization, its role in the PSS-model, and its impact on the “Market Orientation — Performance — Innovation” triad is an urgent problem. There is no single approach on how to systemize studies in this field and existing studies are quite fragmentary.

The purpose of this study is to carry out a systematic review of papers from various databases (Scopus, Web of Science and Emerald Insight), highlighting existing approaches to determining the role of servitization in the PSS-model and to form our own definition. After the analysis of numerous papers on servitization, this paper strives to answer the following research questions.

*RQ1.* What studies exist in the context of determining the essence of servitization according to the triad “Market Orientation — Performance — Innovation”?

*RQ2.* What studies exist on the comparison of servitization structures?

*RQ3.* What roles of servitization do researchers assign to different elements of the Product — Service — Solution model?

In addition, developing this research encourages a systematic review of the literature, mainly in order to learn the basic concepts and elements of servitization for managing this process in companies. Thus, it was necessary to apply the literature review as a methodology to obtain various results using bibliographies related to studies of the various aspects of servitization (1 659 conceptual, meta-analysis and empirical papers from the period 2007–2022), implemented by other authors who use various tools to identify the interrelationships of servitization concepts and strategies implemented by companies in various countries over the past 5–6 years, as well as research related to the process of innovation development in the digital environment.

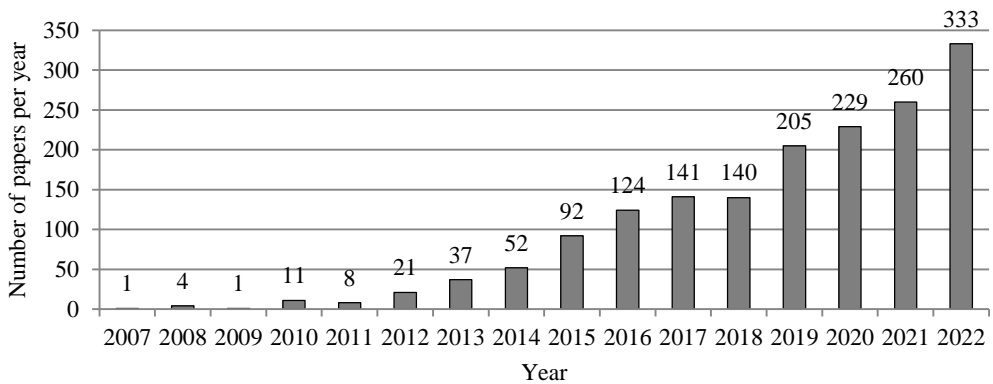
The present research is divided into four sections. The first section covers the background of the research field. The second section covers the methodology used for the systematic review by posing the research questions, in the third section, the results can be found and a review of the scientific evidence. The last section contains the discussion of the findings and conclusion of the research.

## RESEARCH BACKGROUND

This concept first has involved in 2007 [Baines et al., 2007] and since then the number of publications has been growing rapidly (Figure 1), but until now, scientists cannot reach definitive agreement on what servitization is.

As presented in Figure 1, we can highlight one wave of increasing publication's activity between 2012–2015. This period of time was labelled as the “boost of Industry 4.0” [Zhang, Banerji, 2017; Raddats et al., 2019], and the second wave between 2017–2022,

which was known as the “boost of e-commerce and online-business formatting” [Paschou et al., 2020; Kamal et al., 2020; Khanra et al., 2021].



*Figure 1. Publication dynamics on servitization, 2007–2022*

According to [Sjodin, Parida, Kohtamaki, 2016], the servitization literature shows a predominant underlying assumption of a unidirectional product-to-service continuum, where firms “transit from being a product manufacturer into a service provider”, by moving increasingly towards advanced service offerings, which they have a strong motivation to do (e.g., providing functions), since this type of service offering enables the highest profit potential and greater customer satisfaction.

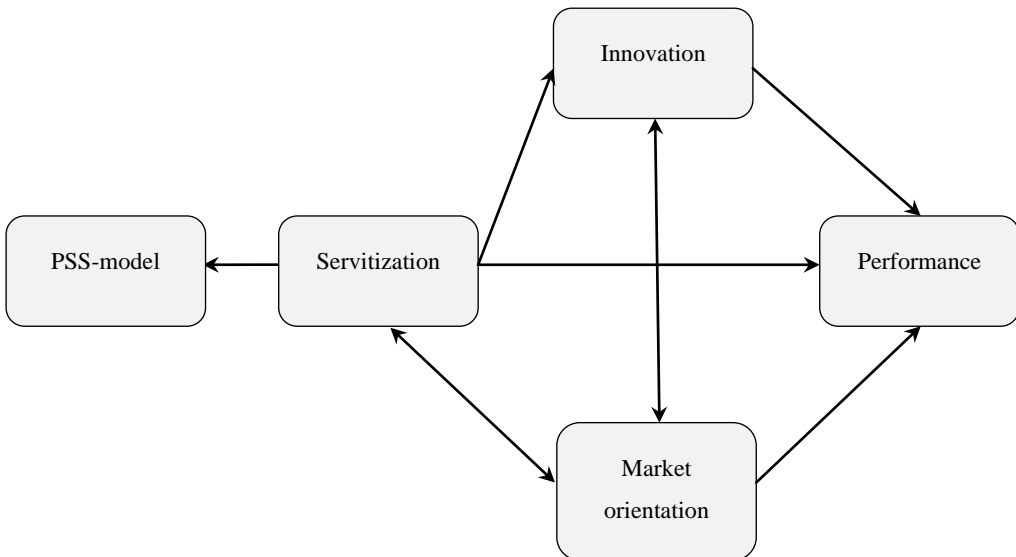
With Industry 4.0, manufacturing has radically changed because of both technological advances as well as new and challenging market requirements [Calabrese et al., 2022], which have caused manufacturing companies to design new value propositions through the extension of services based on product–service systems [Khanra et al., 2021]. This extension process is called servitization [Zhang, Banerji, 2017]. To survive in the current competitive context, characterised by numerous and rapid changes, manufacturers are adopting servitization as a business strategy to meet consumers’ renewed needs, thereby attaining sustainable competitive advantages. In fact, servitization allows manufacturers to integrate products and services into a unique offering, differentiating themselves from competitors and enhancing their competitive advantage. This is even more true if we also consider the recent link between servitization and digital technologies, known as digital servitization [Lee, Chen, Trappey, 2019].

To begin, it’s necessary to start with the basis of the research concept. In the digital age, it’s impossible to run your business without three main directions: market orientation (using customers in the new product creation process according to market conditions), innovation (every company must generate innovations for maintaining their competitiveness), and performance (the companies try to improve performance to a high level). The causal “Market Orientation — Performance — Innovation” triad [Han, Kim, Srivastava, 1998] has been extended to various innovation types [O’Dwyer, Gilmore, 2018] — from technological [Dhewanto, Sohal, 2015] and product innovation

[Liu, Atuahene-Gima, 2018]), to innovation orientation [Bapat, 2017] and capability [Liu et al., 2017].

Moreover, the market orientation research agenda has, during the last five years, highlighted customer orientation as a key component of market orientation that drives innovative activities [Polova, Thomas, 2020; Guarcello, De Vargas, 2020; Visnjic, Neely, Jovanovic, 2018; Liu, Atuahene-Gima, 2018; Martin-Pen, Pinillos, Reyes, 2017; Burton et al., 2017; Pekovic, Rolland, 2016; Wang, Zhao, Voss, 2016]. Customer adoption of technology and new products as well as the customer as a driving force behind the service-dominant logic in the economy [Vargo, Lusch, 2004], and the servitization of innovation [Goduscheit, Faullant, 2018], have prioritised this dimension of market orientation as a potential driving force of firms' innovation activities.

In the age of digitalisation, it is difficult to separate a service and a product from each other. Firstly, if we talk about products bought on the Internet, then the purchase process, itself (online sale), can be attributed to servitization [Parida et al., 2015; Sjodin, Parida, Wincent, 2016; Burton et al., 2016]. Secondly, the transition to a digital environment can also be considered a process of servitization (or digital servitization) [Guarcello, De Vargas, 2020; Lin et al., 2019; Lutjen et al., 2019]. As a result, this phenomenon is dual, and the difficulty lies precisely in clearly understanding which processes are primary and which are secondary. Therefore, the conceptual model can be represented as follows (Figure 2).



*Figure 2. Conceptual model of research*

Despite significant advances in understanding the chain of effects involving market (customer) orientation, innovation, and profitability, such relationships have largely

been studied in developed economies. However, as emerging markets acquire more features of advanced economies, firms in these markets are increasingly turning to customer orientation as a source of competitive advantage and sustained profits. Moreover, researchers have questioned the sources and drivers of innovative activities in the volatile and uncertain context of emerging markets [Jiang et al., 2016].

Customer focus should guide emerging markets firms to devote resources and attention to launching products and solutions that drive profitable growth and, thus, maintain sustainable perspectives on the market. Over the past 30 years, many researchers (e.g., [Baines et al., 2007; Raddats et al., 2019; Tan et al., 2019; Kamal et al., 2020]) have proposed various conceptual frameworks to enable researchers and practitioners to better understand the servitization processes and challenges. To identify the popular conceptual frameworks for servitization, the authors propose to use capability-based, value-based, technology-centred, customer-oriented and production-centric frameworks. For example, a value-based framework might result in overly complex solutions, since it allows for the development of multiple service values, whereas a customer-oriented design, useful for specific customers with clear boundaries, might be too simplistic and lack details on how to identify the required capabilities and technologies. It is clear that a visual and structured process is needed to assist managers in approaching servitization deployment.

Even more important is the customer orientation in the case of a focus on service or a solution that “emphasizes the customer’s importance” [Petri, Jacob, 2016], thus strengthening the critical role of being market- and customer-oriented, to develop the required service or product-service combination. Only a few studies have examined the pivotal roles of manufacturing/technology processes vs. service innovation [Wang, Zhao, Voss, 2016]; however, such foci have not been conceptually or empirically linked to customer orientation. The servitization frameworks described above are useful to provide managers with an overview of concepts and potential barriers, when considering product — service integration. They provide a way of scoping the challenges and identifying relevant issues. However, because they are general purpose, they are not necessarily optimised for the servitization planning task.

This study determines the PSS-model as a fit combination of product, service and solution, which help to better understand a firm’s strategic choice between innovative technology (technology-centred servitization) for new products vs. focus on solution innovation (customer-oriented servitization). The existing combination in the PSS model can create a unique value proposition for a specific customer [Tan et al., 2019; Tauqeer, Bang, 2018; Rau, Zbiek, Jonas, 2017]. At the heart of the problem’s study, we work with conceptual models that are offered by various authors from different countries [Smania et al., 2022; Lin et al., 2019; Wang, Lai, Shou, 2018; Rau, Zbiek, Jonas, 2017; Sjodin, Parida, Wincent, 2016]. Thus, we can identify some research schools and approaches to servitization; identify elements of a conceptual framework of servitization. Based on a highlighted focus on each element of the PSS-model and the characteristics of servitization, effective decision-making models for doing business in the digital economy can be

formed. The chosen focus could direct the efforts of innovative activities to more effective dimensions.

## METHODOLOGY

The article uses the methodology of conducting the systematic review, as developed in [Kitchenham, Charters, 2007]. Overall, this research methodology comprises of five steps: 1) development of the search query; 2) selection of relevant publications and analysis of the research field; 3) evaluative bibliometric techniques; 4) relative bibliometric techniques; 5) analysis of texts in the PSS-model context.

The complete research scheme is represented at Figure 3.

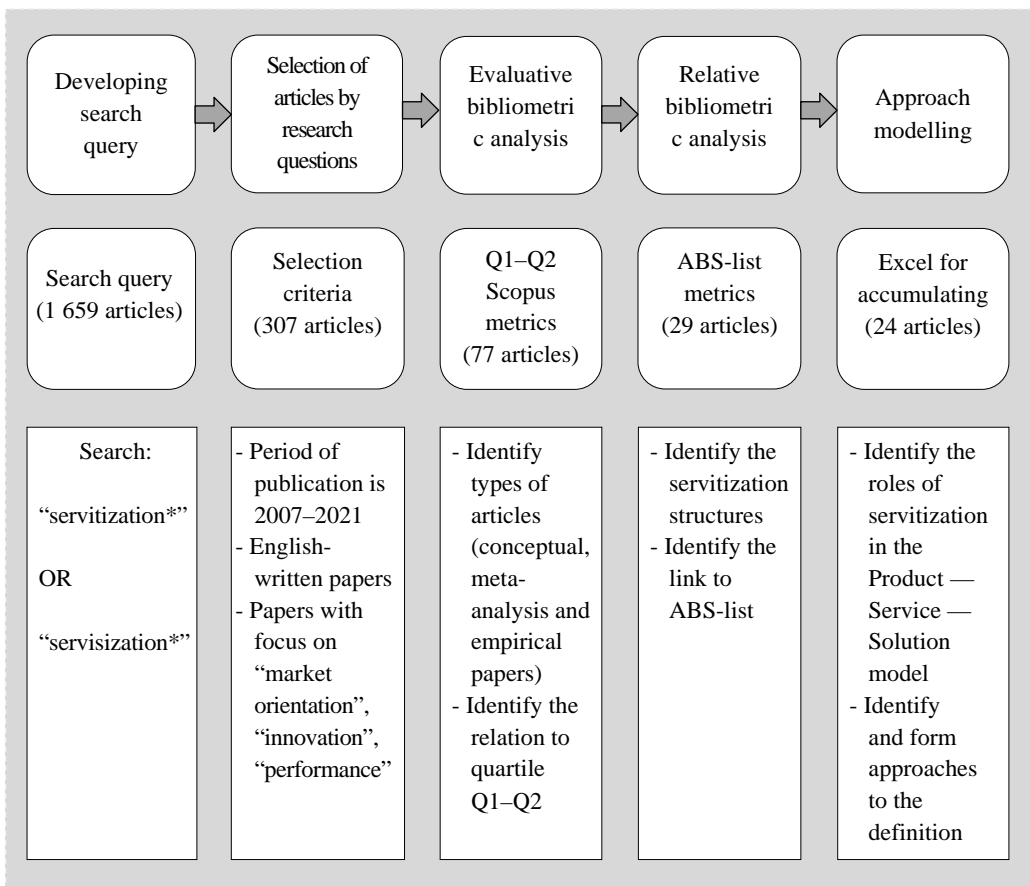


Figure 3. Complete research scheme and papers selection

In the process of planning the review, it is important to consider the need for completeness of coverage of the articles that answer the research questions posed, and which

meet the specified criteria for inclusion or exclusion from the general sample. The results of the review will be considered from the statistical data obtained during the analysis of the selected papers.

The following repositories of indexed scientific papers were used for the review: Scopus, Web of Science and Emerald Insight. The search process was initiated by applying the following search keywords in the repositories, in order to obtain potential results: search 1 — “servitization\*”; search 2 — “servisization\*”. The total number of articles is 1 659. After this, the next stage is organised for focusing on the posed research questions, where the following searches are: search 1 — “Servitization” + “Innovation” + “Market orientation”; search 2 — “Servitization” + “Customer participation” + “Result oriented”; search 3 — “Servitization” + “Service innovation” + “Product service systems” + “Business models”. The results obtained from potential articles were filtered by applying the following inclusion (related items from 2007 to 2022; papers related to indicators for the servitization and innovation process; papers related to the “Market Orientation — Performance — Innovation” triad; papers related to the PSS-model). The study continues, adding the exclusion criteria (papers that do not meet the inclusion criteria; posters, newsletters, theses, letters, books; papers that relate to quartile Q3 and below; papers that are not included in the ABS-list).

A complete review of the papers collected according to the aforementioned points was carried out, finally reaching the reduced group of articles selected to answer the research questions. A great number of articles were excluded as they did not meet the specific criteria. Table 1 is presented below, which explains the search process carried out and demonstrates the representative percentages for each database and year period.

*Table 1. Potential, filtered and selected items*

Period	Potential articles with focus on triad	Depository			Filtered articles by Q1–Q2 criteria	Filtered articles by ABS-list criteria	Selected articles	Percentage, %
		Scopus	Web of Science	Emerald Insight				
2007–2011	14	10	1	3	2	0	0	4.5
2012–2016	100	58	36	6	26	8	5	32.5
2017–2022	193	92	42	59	49	22	19	63.0
Total	307	160	79	68	77	29	24	100
Percentage, %	100	52	26	22	25	9	8	



Of 307 scientific publications found through the search with the potential to solve the research question, 77 scientific publications that passed the inclusion and exclusion criteria (Q1–Q2 criteria) and 29 scientific publications were obtained. After we passed the second round of exclusion criteria (ABS-list criteria) and 24 scientific publications were selected, which completely meet the research criteria. Summarising the first results, the main elements of the conceptual model of servitization are described and presented in 12 journals, where the key authors represent scientific schools from 12 countries in the USA, Europe, China and South America. In the final set of articles, three categories are presented (conceptual, meta-analyses, empirical), so the sample is reliable and reflects all the characteristics of the general set of publications in this field, the results of which are shown below, detailing the author and their respective conclusion of each selected paper.

## RESULTS

**Core results.** When classifying existing definitions and approaches (Table 2), we will highlight the main focus that the authors put into the essence of servitization and formulate their own definition. Basically, all approaches to the definition of “servitization” can be divided into four scientific approaches.

*Table 2. Theoretical approaches to the definition of “servitization”*

No	Source	Definition	Focus on
	1	2	3
1	[Parida et al., 2015, p. 5331]	“...successfully developing effective service innovations for global markets”	Product
2	[Burton et al., 2016, p. 38]	“...is recognised as an opportunity for manufacturing firms to harvest additional value by accessing new sources of revenue and expanding their reach up and down the value chain”	Product
3	[Lutjen, Tietze, Schultz, 2017, p. 515]	“...is a stage of service transition”	Product
4	[Martin-Pen, Pinillos, Reyes, 2017, p. 83]	“...as the process of increasing value by adding services to products; it is driven by customer demand, and is perceived by corporations as sharpening their competitive edge”	Product
5	[Visnjic, Neely, Jovanovic, 2018, p. 83]	“...is an outcome-based market strategy, whereby the firm guarantees the outcome (result) that the customer requires and combines diverse products with the service offer”	Product

6	[Sjodin, Paridaa, Kohtamakib, 2019, p. 906]	"...a transition from selling standard products to increasingly selling advanced product-service systems — to secure competitiveness"	Product
7	[Lütjen et al., 2019, p. 516]	"...as relevant strategies to counteract "commoditisation" in manufacturing industries, while prior research has paid little attention to investigating what manufacturing industries could learn from commodity industries, where products and services have a high level of standardisation"	Product
8	[Ayala, Gerstlberger, Frank, 2019, p. 43]	"...as a strategic business transformation from the traditional "pure" product-centred offering to an integrated product and service value offering, often named as product-service system (PSS)"	Product
9	[Rondi, De Massis, Kraus, 2021, p. 436]	"...is the business model transition from products to bundles of product and service (product-service systems) transforming a product-oriented manufacturing firm towards a service-oriented one"	Product
10	[Kindstrom, Kowalkowski, 2014, p. 96]	"...growing the service component in many product-centric firms, referred to as service infusion in manufacturing"	Service
11	[Johansson, Raddats, Witella, 2019, p. 323]	"...based on adding either incremental or radical service innovations to the existing range of services"	Service
12	[Tauqeer, Bang, 2018, p. 1]	"...is the natural next step for established companies to ensure sustainability, it also offers opportunities for small and medium enterprises (SMEs). It is regarded as the process of adding value to products by adding services"	Solution
13	[Morgan, Anokhin, Wincent, 2019, p. 499]	"...implies a major environmental change that necessitates the enactment of external factors including, among other elements, current and prospective customers"	Solution
14	[Polova, Thomas, 2020, p. 232]	"Servitization process is collaborative and innovative by nature, and the need for extensive and close collaboration for value co-creation determined by a collaborative effort"	Solution
15	[Sjodin, Parida, Kohtamaki, 2016, p. 5331]	"...is the product customisation process as part of an integrated solution to increase customer value"	PSS-model
16	[Sjodin, Parida, Wincent, 2016, p. 117]	"...value co-creation in provider — customer relationships"	PSS-model

	1	2	3
17	[Burton et al., 2017, p. 29]	"...opportunities for value creation in the face of falling product revenues and increasingly competitive product markets, are developing new service offerings to complement, or take the place of, product offerings"	PSS-model
18	[Rau, Zbiek, Jonas, 2017, p. 49]	"...is a service design process: Exploration — Creation — Reflection — Implementation"	PSS-model
19	[Wang, Lai, Shou, 2018, p. 1566]	"...as an effective means for manufacturers to achieve superior performance"	PSS-model
20	[Lenka et al., 2018, p. 812]	"...is a progressive transition from product to service orientation"	PSS-model
21	[Tan et al., 2019, p. 16]	"...is an opportunity for manufacturers to sell more products by adding services to satisfy buyers' needs"	PSS-model
22	[Lin et al., 2019, p. 296]	"...as a learning process that change corporates' practical, behavioural and intellectual habits"	PSS-model
23	[Guarcello, De Vargas, 2020, p. 361]	"...the mindset shifts from product creation to a more integrated view of an ecosystem and its resources and processes to increase value creation for clients with products, services or experiences"	PSS-model
24	[Smania et al., 2022, p. 1]	"...is demanding more digital technologies to understand customers' needs and processes, to collect and exchange data and to improve offerings"	PSS-model

The core of the first concept is the integration of innovative companies into international markets, using digital technologies for service functions. The authors of this approach define servitization as "effective service innovations" [Parada et al., 2015]. We named it as the "digital effective service" approach.

The second approach is based on the idea that servitization creates added value to an innovative product, and the consumer should be involved in the product development at the stage of pre-project preparation. The main idea focuses on the process of product creation with the customers' participation, defining this process as "value co-creation in provider–customer relationships". We named it as the "involved co-creation" approach.

The third approach is based on changing the focus of the overall business strategy, from a product-oriented (material) to a services-oriented one (digital): servitization is "a progressive transition from product and service orientation to generation the solutions" [Lenka et al., 2018]. We named it as the "digital solutions" approach.

The fourth concept is based on an exceptional opportunity to obtain additional benefits for the company through servitization. The authors of the concept delight in the unity of the bundle of Product — Service — Solution, promote various combinations in a conceptual PSS-model and define servitization as “an effective means for manufacturers to achieve superior performance” [Wang, Lai, Shou, 2018, p. 1565]. We named it as the “synergy of the PSS-model” approach.

Despite the rather wide coverage of definitions and concepts of servitization, there is fragmentation and a lack of a unified approach to definition in theory, which makes it difficult for companies to correctly perceive this phenomenon in the process of developing a growth and business development strategy. One of the objectives of this study is to streamline existing approaches and concepts based on an in-depth study of the existing theoretical framework and systematisation of fundamental differences in the understanding of servitization.

We generate our own definition of servitization as follows: *servitization is the organisational process of creating innovations in the company's activities, which is achieved by the condition of effective interaction of elements of the PSS model, its equivalent value in the innovation being created, aimed at the customer consumption in both physical and digital environments.*

**Additional results.** To prove the accuracy of the presented definition, we will consider the properties and characteristics of servitization, which are clearly traced in the systematic literature review and highlight the most important among them. Each paper was analysed according to its focus by three directions: main direction (the bias to one of the elements of the triad prevails); servitization structures' comparison frameworks (objects of empirical research or meta-analysis); focus on elements' PSS-model. The summary results of the analytical study of the papers are presented in Table 3.

When analysing the results obtained for research on the focus of servitization in the aspect of the “Market Orientation — Performance — Innovation” triad, it can be noted that the authors of the articles considered are generally balanced, although there is a slight tendency towards innovation as the most relevant perceptual of business development. From a percentage point of view, the percentage of related studies for each of them was 25, 42 and 33%, respectively. In response to RQ1, it can be pointed out that, among modern publications, there is a focus of servitization in the aspect of the “Market Orientation — Performance — Innovation” triad in all 24 studies, which proves the relevance and development of this concept in the theoretical field.

When analysing the results obtained on the basis of existing servitization structures, it is noted that most of the authors of the articles reviewed mainly use the focus of consideration of servitization from the position of customer orientation (29%) — this is logical, since market orientation is primarily aimed at customer satisfaction in all possible ways. The second place in the number of publications is the focus of consideration on production-centric servitization (25%) — this is also explained by the fact that innovation and servitization are practically identical processes. The third significant position of the authors on the focus of consideration of the servitization

is capability-based (21%) — servitization helps to release additional opportunities of the company, which increase the potential in a competitive environment. Answering RQ2, it can be pointed out that three key focuses were identified for the servitization structure.

Table 3. The analytical study of the systematic literature review

Property and characteristic of servitisation	Presence in paper	Total	Percentage, %
<i>The main direction</i>			
Market orientation	1, 4, 5, 14, 17, 23	6	25
Innovation orientation	3, 7, 9, 10, 11, 15, 16, 18, 21, 24	10	42
Performance orientation	2, 6, 8, 12, 13, 19, 20, 22	8	33
<i>The servitization structures' comparison frameworks</i>			
Capability-based	1, 4, 6, 7, 21	5	21
Value-based	2, 12, 19	3	12.5
Technology-centred	14, 17, 24	3	12.5
Customer-oriented	5, 11, 13, 15, 18, 22, 23	7	29
Production-centric	3, 8, 9, 10, 16, 20	6	25
<i>The focus on elements' PSS-model</i>			
Product	1, 2, 3, 4, 5, 6, 7, 8, 9	9	37.5
Service	10, 11	2	8
Solution	12, 13, 14	3	12.5
Product — Service — Solution	15, 16, 17, 18, 19, 20, 21, 22, 23, 24	10	42

When analysing the results obtained, based on the assessment of the role of various elements of servitization in the PSS-model, it can be noted that the authors of the selected articles mainly consider bundles of elements more often than each element of the model separately. This leads to the conclusion that the individual elements, themselves,

cannot be the object of servitization, namely, their element-by-element interaction is the basis for the formation of the servitization process in business. From a percentage point of view, the elements of the PSS-model have a very strong connection throughout (42% of the number of all selected publications confirm this). Answering RQ3, it can be pointed out that at the end of 2022, two types of servitization had been formed and exist in the theoretical field, which differ in the inclusion of several elements, or all elements simultaneously, in the company's business process.

## CONCLUSION

With regard to the systematic review of the literature, the following conclusions were drawn. Starting from the global searching, we found 1 659 papers related to the phenomenon, “servitization”. After we used inclusion and exclusion factors, every selection step reduced the list of papers (decreased to 24 articles). The chosen method allows us to make a contribution to the theories about servitization, focusing on the main basic approaches. It was revealed that servitization, in the aspect of the “Market Orientation — Performance — Innovation” triad, enhances opportunities to meet the needs of consumers: firstly, the process of servitization is aimed at increasing the competitive position of the company in the market, and secondly, a focus on innovation, which can be scaled to large volumes, seeking to reduce risks in the process of creating new products and ensuring closer communication between the client and the development team, thereby ensuring quality results. In this study, it was revealed that serving in modern conditions tends to be customer-oriented and product-centric to a greater extent than to the development of the internal potential and capabilities of the company, since it helps to improve the interaction of consumers and the company, itself, in the long term. This requires that companies ensure interaction between all elements within the PSS-model as the effect of servitization increases with greater probability.

Based on the analysed approaches to the definition “servitization”, it was possible to identify and expand the fourth approach — “servitization through the prism of the PSS-model”. This fact allowed us to harmoniously separate the managerial aspect from the marketing aspect for businesses that have moved to the online environment, considering the increased focus on the equivalent influence of PSS-model elements on innovation activity. This insight will allow the business to more specifically (depending on the set of components of the strategy used) orient the vectors of development in the long term. Currently, it is more the norm to ensure all business processes in the aspect of product servitization — a direct message to management than just a competitive advantage — a departure from a purely marketing orientation. However, additional research should be carried out to prove this statement.

Future research will be aimed at studying the model in various business areas (from industrial enterprises to small service enterprises) to determine the specifics of the behaviour of the model on the effectiveness of business indicators. It is also planned to apply an integrated approach to the formation of theoretical aspects of ser-

vitization in the context of Industry 4.0, based on a comparison of various literature reviews by country, market and business orientation (innovation, financial performance, consumer, market, etc.).

This study has several limitations that can also be used as input data for further research. Firstly, this study uses a sample that is limited to search keywords in the specified databases. Thus, the results of the study cannot be generalised for all companies and countries in the world. For this reason, it is necessary to conduct further research using a larger number of databases; it is possible to reduce the level of the filtering criteria in order to determine how servitization can affect the innovative activity of companies in countries that have not been selected. Secondly, in this study, innovative companies are used as the objects of research, regardless of the activity's profile, which made it possible to generalise the results without structural market features. So, in order to summarise the results we have obtained, it is necessary to conduct further research to compare different countries, different profiles of companies or different types of industries.

## References

- Ayala N. F., Gerstlberger W., Frank A. G. 2019. Managing servitization in product companies: The moderating role of service suppliers. *International Journal of Operations & Production Management* **39** (1): 43–74.
- Baines T. S., Lightfoot H. W., Evans S., Neely A., Greenough R., Peppard J., Roy R., Shehab E., Braganza A., Tiwari A., Alcock J. R., Angus J. P., Bastl M., Cousens A., Irving P., Johnson, M., Kingston J., Lockett H., Martinez V., Michele P., Tranfield D., Walton I. M., Wilson H. 2007. State-of-the-art in product-service systems. *Proceedings of the Institution of Mechanical Engineers Part B-Journal of Engineering Manufacture* **221** (10): 1543–1552.
- Bapat D. 2017. Linking strategic orientation with performance: Implication for Indian banks. *Strategic Change — Briefings in Entrepreneurial Finance* **26** (4): 403–411.
- Burton J., Story V. M., Raddats C., Zolkiewski J. 2017. Overcoming the challenges that hinder new service development by manufacturers with diverse services strategies. *International Journal of Production Economics* **192**: 29–39.
- Burton J., Story V., Zolkiewski J., Raddats C., Baines T. S., Medway D. 2016. Identifying Tensions in the Servitized Value Chain. *Research-Technology Management* **59** (5): 38–47.
- Calabrese A., Dora M., Levaldi Ghiron N., Tiburzi L. 2022. Industry's 4.0 transformation process: How to start, where to aim, what to be aware of. *Production Planning and Control* **33** (5): 492–512.
- Dhewanto W., Sohal A. S. 2015. The relationship between organisational orientation and research and development/technology commercialisation performance. *Research & Development Management* **45** (4): 339–360.
- Goduscheit R. C., Faullant R. 2018. Paths toward radical service innovation in manufacturing companies: A service-dominant logic perspective. *Journal of Product Innovation Management* **35** (5): 701–719.
- Guarcello C., de Vargas E. R. 2020. Service innovation in healthcare: A systematic literature review. *Latin American Business Review* **21** (4): 353–369.
- Han J. K., Kim N., Srivastava R. K. 1998. Market orientation and organizational performance: Is innovation a missing link? *Journal of Marketing* **62** (4): 30–45.
- Huang Y. D., Chai Y. T., Liu Y., Shen J. P. 2019. Architecture of next-generation e-commerce platform. *Tsinghua Science and Technology* **24** (1): 18–29.

- Jiang C. X., Yang Q., Song S., Annavarjula M. 2016. Emerging markets firms' catch-up strategy in new product development: Cases from Chinese companies. *International Journal of Business and Emerging Markets* **8** (3): 324–339.
- Johansson A. E., Raddats C., Witell L. 2019. The role of customer knowledge development for incremental and radical service innovation in servitized manufacturers. *Journal of Business Research* **98**: 328–338.
- Kamal M. M., Sivarajah U., Bigdeli A. Z., Missi F., Koliouis Y. 2020. Servitization implementation in the manufacturing organisations: Classification of strategies, definitions, benefits and challenges. *International Journal of Information Management* **55**: 102206.
- Khanra S., Dhir A., Parida V., Kohtamäki M. 2021. Servitization research: A review and bibliometric analysis of past achievements and future promises. *Journal of Business Research* **131**: 151–166.
- Kindstrom D., Kowalkowski C. 2014. Service innovation in product-centric firms: A multidimensional business model perspective. *Journal of Business & Industrial Marketing* **29** (2): 96–111.
- Kitchenham B., Charters S. 2007. *Guidelines for Performing Systematic Literature Reviews in Software Engineering*. Version 2.3, EBSE Technical Report, EBSE-2007-01, Software Engineering Group, School of Computer Science and Mathematics, Keele University, Keele, Staffs, ST5 5BG, UK and Department of Computer Science, University of Durham, UK Durham.
- Lee C.-H., Chen C.-H., Trappey A. J. C. 2019. A structural service innovation approach for designing smart product service systems: Case study of smart beauty service. *Advanced Engineering Informatics* **40**: 154–167.
- Lenka S., Parida V., Sjodin D. R., Wincent J. 2018. Towards a multi-level servitization framework: Conceptualizing ambivalence in manufacturing firms. *International Journal of Operations & Production Management* **38** (3): 810–827.
- Lin Y., Luo J., Jeromonachou P., Rong K., Huang L. 2019. Strategic orientation of servitization in manufacturing firms and its impacts on firm performance. *Industrial Management & Data Systems* **119** (2): 292–316.
- Liu W. P., Atuahene-Gima K. 2018. Enhancing product innovation performance in a dysfunctional competitive environment: The roles of competitive strategies and market-based assets. *Industrial Marketing Management* **73**: 7–20.
- Liu X. Y., Huang Q. H., Dou J. S., Zhao X. D. 2017. The impact of informal social interaction on innovation capability in the context of buyer-supplier dyads. *Journal of Business Research* **78**: 314–322.
- Lutjen H., Schultz C., Tietze F., Urmetzer F. 2019. Managing ecosystems for service innovation: A dynamic capability view. *Journal of Business Research* **104**: 506–519.
- Lutjen H., Tietze F., Schultz C. 2017. Service transitions of product-centric firms: An explorative study of service transition stages and barriers in Germany's energy market. *International Journal of Production Economics* **192**: 106–119.
- Martin-Pen M. L., Pinillos M. J., Reyes L. E. 2017. The intellectual basis of servitization: A bibliometric analysis. *Journal of Engineering and Technology Management* **43**: 83–97.
- Morgan T., Anokhin S. A., Wincent J. 2019. New service development by manufacturing firms: Effects of customer participation under environmental contingencies. *Journal of Business Research* **104**: 497–505.
- O'Dwyer M., Gilmore A. 2018. Value and alliance capability and the formation of strategic alliances in SMEs: The impact of customer orientation and resource optimisation. *Journal of Business Research* **87**: 58–68.
- Parida V., Sjodin D. R., Lenka S., Wincent J. 2015. Developing global service innovation capabilities how global manufacturers address the challenges of market heterogeneity. *Research-Technology Management* **58** (5): 35–44.
- Paschou T., Rapaccini M., Adrodegari F., Saccani N. 2020. Digital servitization in manufacturing: A systematic literature review and research agenda. *Industrial Marketing Management* **89**: 278–292.



- Pekovic S., Rolland S. 2016. Customer orientation and firm's business performance. *European Journal of Marketing* **50**: 2162–2191. <https://doi.org/10.1108/ejm-08-2015-0584>
- Petri J., Jacob F. 2016. The customer as enabler of value (co)-creation in the solution business. *Industrial Marketing Management* **56**: 63–72.
- Polova O., Thomas C. 2020. How to perform collaborative servitization innovation projects: The role of servitization maturity. *Industrial Marketing Management* **90**: 231–251.
- 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.
- Rau C., Zbiek A., Jonas J. M. 2017. Creating competitive advantage from services: A design thinking case study from the commodities industry. *Research-Technology Management* **60** (3): 48–56.
- Rondi E., De Massis A., Kraus S. 2021. Servitization through open service innovation in family firms: Exploring the ability-willingness paradox. *Journal of Business Research* **135**: 436–444. <https://doi.org/10.1016/j.jbusres.2021.06.040>
- Sjodin D. R., Parida V., Kohtamaki M. 2016. Capability configurations for advanced service offerings in manufacturing firms: Using fuzzy set qualitative comparative analysis. *Journal of Business Research* **69** (11): 5330–5335.
- Sjodin D. R., Parida V., Wincent J. 2016. Value co-creation process of integrated product-services: Effect of role ambiguities and relational coping strategies. *Industrial Marketing Management* **56**: 108–119.
- Sjodin D., Parida V., Kohtamaki M. 2019. Relational governance strategies for advanced service provision: Multiple paths to superior financial performance in servitization. *Journal of Business Research* **101**: 906–915.
- Smania G. S., Mendes G. H. D., Lizarelli F. L., Favoretto C. 2022. Service innovation in medical device manufacturers: Does the digitalization matter? *Journal of Business & Industrial Marketing* **37** (3): 578–593.
- Tan K. H., Ji G. J., Chung L., Wang C. H., Chiu A., Tseng M. L. 2019. Riding the wave of belt and road initiative in servitization: Lessons from China. *International Journal of Production Economics* **211**: 15–21.
- Tauqeer M. A., Bang K. E. 2018. Servitization: A model for the transformation of products into services through a utility-driven approach. *Journal of Open Innovation: Technology, Market, and Complexity* **4** (60): 1–20.
- Vargo S. L., Lusch R. F. 2004. Evolving to a new dominant logic for marketing. *Journal of Marketing* **68** (1): 1–17.
- Vandermerwe S., Rada J. 1988. Servitization of business: Adding value by adding services. *European Management Journal* **6** (4): 314–324.
- Visnjic I., Neely A., Jovanovic M. 2018. The path to outcome delivery: Interplay of service market strategy and open business models. *Technovation* **72–73**: 46–59.
- Wang W. J., Lai K. H., Shou Y. Y. 2018. The impact of servitization on firm performance: A meta-analysis. *International Journal of Operations & Production Management* **38** (7): 1562–1588.
- Wang Q., Zhao X., Voss C. 2016. Customer orientation and innovation: A comparative study of manufacturing and service firms. *International Journal of Production Economics* **171** (2): 221–230.
- Zhang W., Banerji S. 2017. Challenges of servitization: A systematic literature review. *Industrial Marketing Management* **65**: 217–227.

Received: March 18, 2023

Accepted: October 23, 2023

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## СЕРВИТИЗАЦИЯ В ЦИФРОВУЮ ЭПОХУ: СИСТЕМАТИЧЕСКИЙ ОБЗОР

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**Для цитирования:** Sharko E. R., Rebiazina V. A. 2023. Servitization in the digital age: A systematic review. *Вестник Санкт-Петербургского университета. Менеджмент* 22 (4): 476–493.  
<http://doi.org/10.21638/11701/spbu08.2023.402>

С развитием цифровизации возрастает количество форм инновационной деятельности компаний, что повышает интерес к актуальности внедрения концепции сервитизации в бизнес, функционирующий в онлайн-среде. Однако в исследованиях до сих пор не сформировано общее определение феномена сервитизации. Цель статьи — провести систематический обзор статей из различных баз данных, описать существующие подходы к установлению роли сервитизации в модели PSS и представить авторскую интерпретацию понятия «сервитизация». В исследовании выявлен общий массив статей о сервитизации (1 659 концептуальных, метааналитических и эмпирических) из баз данных Scopus, Web of Science и Emerald Insight. Далее они проанализированы в соответствии с разными критериями для включения в окончательную выборку или исключения из нее. В итоге для детального анализа были отобраны 24 статьи. Результаты исследования включают авторское определение сервитизации, а также выделение четырех основных подходов к этому понятию. Вклад авторов в развитие теории сервитизации заключается в усилении акцента на роли сервитизации в модели Production — Service — Solution. Внедрение концепции сервитизации повышает инновационную активность компаний, представляющих свой продукт в цифровой среде. На основе дальнейшего изучения свойств и характеристик сервитизации могут быть сформированы эффективные модели принятия решений для ведения бизнеса в цифровой экономике.

**Ключевые слова:** сервитизация, цифровая экономика, PSS-модель, инновация, рыночная ориентация, продукт, услуга, решение.

Статья поступила в редакцию 18 марта 2023 г.

Статья рекомендована к печати 23 октября 2023 г.

### Контактная информация

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Статья подготовлена по результатам фундаментальных исследований, выполненных в рамках научно-исследовательского проекта 2022.002Р. Ребязина В. А. «Доверие потребителей как институциональный фактор развития цифровой экономики России» Высшей школы бизнеса НИУ ВШЭ в 2022–2024 гг.