



## Servitisation in Manufacturing Firms in Developing Country: Evidence from Serbia

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### Abstract

*Current trends in manufacturing industry, such as market globalization, improved competitiveness of developing country, higher customer demands and similar, have made it compulsory for manufacturers to promote their offer and shift their focus towards combination of manufacturing and services. As a result, increasing number of manufacturing firms started including product-related services in their offer, boosting the value for their customers. This trend of turning manufacturers into service providers is known as servitisation. The purpose of this study is to examine the extent to which servitisation has affected manufacturing industry in Serbia and how certain factors (batch size, product complexity, cooperation in product-related services and firm size) influence the degree of servitisation. Furthermore, the aim of the paper is to compare the results with the study findings from developed countries. For this purpose, data taken from European Manufacturing Survey are used. Results show that high percentage of manufacturers appear on market as also service providers. However, the turnover by services is still relatively low where notable differences are demonstrated depending on the firm size. All model constructs (batch size, product complexity, cooperation in product-related services and firm size) have demonstrated statistical significance for differences in the servitisation intensity.*

**Key words:** Servitisation, manufacturing firms, product-related services, EMS

### 1. INTRODUCTION

Servitisation represents the trend of providing services along with or even instead of their traditional physical products is known as servitisation of manufacturing [1].

In the last decade, the notable increase of services offered by manufacturing companies has gained major attention in the literature. Trends, such as market globalization, improved competitiveness of developing

country, higher customer demands and similar, have made it compulsory for manufacturers to promote their offer and shift their focus towards combination of manufacturing and services [2]. As a result, increasing number of manufacturing firms started including product-related services in their offer, boosting the value for their customers. Services in the manufacturing industry are product-related services which are offered to customers together with the main products as an integrated solution [3], and are seen as a major source of competitive advantage for manufacturers [4].

According to [5] and [6], manufacturing firms have several reasons to include more services in their total offering to: “enhance the sales of their goods; lengthen customer relationships; create and promote growth opportunities in matured markets; balance the effects of economic cycles with different cash-flows; and respond to demands”.

Therefore, this study aims to tackle following research questions in regards to servitisation of manufacturing industry in developing economy such as Serbia:

(1) What is the share of turnover from product-related services in total turnover and what are the most offered services?

(2) How certain factors (firm size, batch size, product complexity, and cooperation in product-related services) influence the degree of servitisation, using regression model analysis?

(3) Do results differ in comparison to developed economies?

The paper is structured as follows: the second section represents the theoretical background and states the assumptions on differences in the degree of servitisation. The fourth section describes the research methodology. In the fifth section, we discuss the results and link the findings to the existing literature. Finally, the sixth section presents conclusions.

## 2. THEORETICAL BACKGROUND

### 2.1 Servitisation

Up to now, a variety of terms has been created to describe and study the phenomenon of manufacturers turning into service providers. Different authors have proposed different terms for the output of servitisation [7], [8], [9], such as: product-service systems [10], product related services [11], integrated solutions [1], [5], [6] or service infusion [2].

In the past few decades practitioners and academicians have categorized the reasons why manufacturing firms servitize into three groups of rationales: strategic rationales for servitisation [9], economic and environmental rationales [11], [12], [13].

The research addressing this trend has been primarily based on case studies [5], [6], [11], [14]. So far, there are few quantitative studies [1], [2], [8], [14] considering this topic. However, these studies are focusing on developed countries. Related to that, this paper addresses the trend of servitisation in developing country.

### 2.2 Hypothesis development

Based on the literature review, four assumptions have been developed.

First assumption considers the influence of firm size on servitisation intensity. Certain studies related to this topic reported that examples of leading practices in the adoption of servitisation are mainly focused on large companies [1], [7]. Furthermore, it is believed that the likelihood that the firm will offer a combination of manufacturing and service increases in case of larger firms [15].

Taking into the consideration that these studies were done in developed countries, it still remains open if firm size has the same influence on servitisation in transitional countries. Hence:

**H1: The degree of servitisation increases with the firm size.**

The second hypothesis tests the relationship between product complexity and servitisation intensity. Authors [4] noticed that services such as: training, consulting, maintenance and other operation services, are more needed in case of purchase of complex product with variety of functionalities than in case of simple products purchase. Leo and Philippe [15] argue that complexity of products might be one of the crucial characteristics of the product pushing customers toward additional services, i.e. product-related services.

**H2: There is a positive relationship between product complexity and the degree of servitisation.**

In their study, based on results from developed countries participating in EMS [2], authors conclude that degree of servitisation is higher for products realized in small batches or as single units. Batch size seems to be relevant since smaller batches indicate customization and individual production, which offers a greater necessity to combine products and services into an integrated offerings based on customization needs [2]. This implies:

**H3: Servitisation intensity depends on the product batch size.**

Finally, another aspect that could influence servitisation intensity is the inter-organizational cooperation for development of innovative product-related services. Innovation implies introduction of goods/services on the market which are new to the firm or to market [16], while

inter-organizational collaboration enhances innovation potential. We therefore assume:

**H4: There is a positive relationship between the degree of servitisation and inter-organizational cooperation for new product-related services development.**

Mostly, authors have measured servitisation intensity as the share of sales from product-related services in total turnover for the firms offering services [1], [2], [14].

### 3. RESEARCH METHODOLOGY

Data from 280 manufacturing firms in Serbia participating in the European Manufacturing Survey [17] (EMS) were included in this study. EMS, coordinated by the Fraunhofer Institute for Systems and Innovation Research - ISI, represents the largest European survey of manufacturing activities whose extensive questionnaire covers questions generally referring to organizational concepts, collaboration for innovation, cooperation issues, the application of advanced technologies and innovative concepts, project management, performance indicators and others. The main focus of the survey is the development and utilization of different types of innovations by companies in the manufacturing industries, and associated performance effects.

Our research based on EMS data is from the Serbian subsample from the year 2015. The responding companies were from the manufacturing sector (NACE Rev 2 codes from 10 to 33), having at least 20 employees. In order to obtain representative sample, 828 manufacturing firms evenly distributed by sectors and regions across Serbia were contacted. Total number of companies participating in the survey was 280 (34.4% response rate). About 38.2% of the firms in the sample are small firms between 20 and 49 employees, another 50.4% of the firms have between 50 and 249 employees, and 11.5% of the firms have more than 250 employees. The largest industry in the sample is the manufacture of food products (NACE 10), followed by manufacture of fabricated metal products, except machinery and equipment (NACE 25) and the manufacture of rubber and plastic products (NACE 22).

Tables 1 and 2 give an overview of the sample.

**Table 1.** EMS database – distribution of firms by size

Firm size	n	%
20 to 49 employees	107	38,2
50 to 249 employees	141	50,4

250 and more employees	32	11,5
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Source: EMS

**Table 2.** Classification on manufacturing sectors according to share on total sample

NACE Rev. 2	Manufacturing industry	Share on total sample (%)
10	Manufacture of food products	17,9
25	Manufacture of fabricated metal products, except machinery and equipment	13,6
22	Manufacture of rubber and plastic products	8,6
28	Manufacture of machinery and equipment n.e.c.	6,4
27	Manufacture of electrical equipment	5,7
14	Manufacture of wearing apparel	5,4
23	Manufacture of other non-metallic mineral products	5,4
18	Printing and reproduction of recorded media	4,6
31	Manufacture of furniture	4,6
29	Manufacture of motor vehicles, trailers and semi-trailers	4,3
16	Manufacture of wood and of products of wood and cork, except furniture	3,9
20	Manufacture of chemicals and chemical products	3,2
13	Manufacture of textiles	3,2
	Others	16,3

Source: EMS

Data gathering was performed by the Faculty of Technical Sciences in Novi Sad, firstly through the pre-test phase and two phases of mass distribution.

Multiple regression analysis was used to examine the possible statistical relevance of observed factors for the differences in the degree of servitisation in manufacturing firms. For this purposes IBM SPSS V.23 software was used.

### 4. RESULTS AND DISCUSSION

Out of 280 manufacturing firms in Serbia participating in EMS project, 139 firms are offering at least one product-related service to their customers. Product-related

services included in European Manufacturing Survey are:

- assembly/initial start-up procedure,
- maintenance/repair,
- training,
- design/consulting/project planning,
- software development,
- remote support for clients,
- revamping/modernization,
- redemption services.

The most frequently offered product-related services are: maintenance/repair, design/consulting/project planning and training (figure 1).



Figure 1. Share of firms offering product-related services (%)

Observing this results it could be discussed that high percentage of manufacturers appear on market as also service providers. Previous studies show that, globally, over a third of large manufacturing firms offer services, with the proportion increasing to almost 60% in Western economies [8], while others [2] suggest that in their sample more than 85% of manufacturing companies reported offering at least one type of service.

However, although the percentage of firms offering product-related services is relatively high, the turnover generated by services is still lower. Observing the sample of Serbian manufacturing firms, around 37% of firms offering services declared not to have turnover generated by services, while 19% of companies have up to 10%, and 9% over 10% share of turnover from product-related services in total turnover. This demonstrates slightly less convenient situation compared to the results for developed countries, where the overall value of sales generated by services was reported to be 16% on average [14]. One possible explanation might be the economical background, while also it could be related to the undeveloped service strategy pursued by a company [18].

Despite expected increase of intensity of servitisation with the increase of firm size, the results show opposite

situation. On average, small firms report the turnover generated by services up to 23 percent, while the share decreases with the medium and large sized companies to 6 and 9 percent, respectively (figure 2).

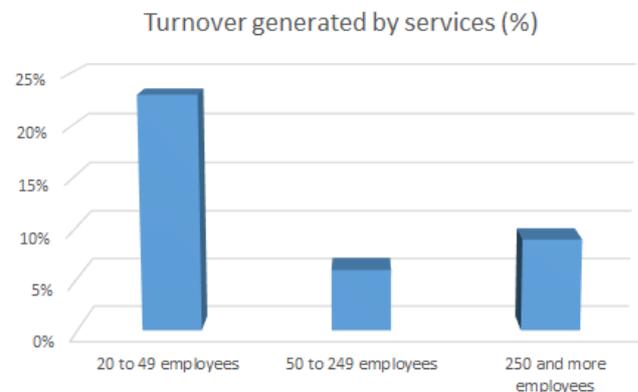
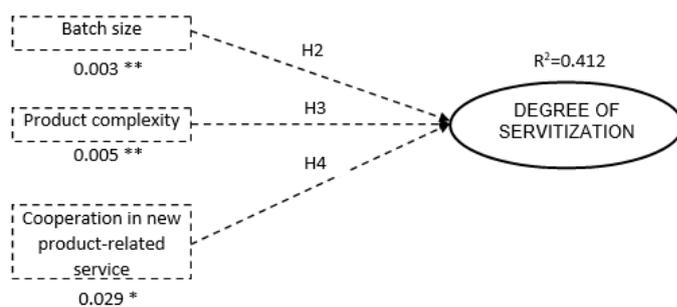


Figure 2. Share of firms offering product-related services (%)

It seems that small companies have stronger focus on their service strategy and benefit from their closer interaction with customers [3]. Similar results were reported in studies from developed countries [3], [1], where both, small and medium manufacturing firms demonstrated notably higher turnover generated by services than large companies. Considering previously said, hypothesis one was rejected.

The multiple linear regression model was used to examine the hypothesized relationships among the variables. The effects of independent variables (batch size, product complexity and inter-organizational cooperation in product-related services) on the degree of servitisation were analyzed based on data from 280 firms in Serbia. Figure 3 depicts the results for our hypothesis 2, 3 and 4.



Legend: \* statistically significant at <0.05; \*\* statistically significant at <0.01;

Figure 3. Research model

R<sup>2</sup> value (0.412) indicates that overall there is a positive relationship between model constructs (batch size, product complexity and inter-organizational cooperation in product-related services) and degree of servitisation,

i.e. that presented model explains about 41% of the variances in servitisation level.

The statistical significance of each dimension separately (batch size, product complexity, industry and inter-organizational cooperation in product-related services) on dependent variable was examined, analyzing the value of their significance path coefficients.

The results show that batch size and product complexity have the greatest positive influence on the degree of servitisation; they obtain significance path coefficients 0.003 and 0.005, respectively (figure 3). Furthermore, inter-organizational cooperation in new product-related services development also have statistical significance for servitisation level (values < 0.05) (figure 3).

Taking into consideration these results, it can be said that hypothesis 2, 3 and 4 are not rejected. Positive effect of batch size and product complexity confirm the results from previous studies performed in develop countries [1], [2], [3], [4], [14]. It shows that customization and individual production related to the single units or small batch size and more complex products imply the need for closer cooperation between manufacturer and customer and certain services (training, consultancy, assembly and other) based on clients' needs.

Furthermore, the collaboration of manufacturing firms with other organizations enhances their innovation potential, enhancing the capability to offer different and new product-related services relevant for their customers and turnover generated by them, as shown in figure 3. This is particularly important for small and medium enterprises in developing country such as Serbia, since their innovativeness is strongly supported by inter-organizational collaboration for product or service innovation [19].

## 5. CONCLUSION

This study is a contribution in the field of service infusion in manufacturing sector. Its subject is to analyze the extent to which servitisation has affected manufacturing industry in Serbia (what are the most offered services and what is the share of turnover from product-related services in total turnover) and to examine how certain factors (firm size, batch size, product complexity, and cooperation in product-related services) influence the servitisation intensity.

The results show that the high number of manufacturing firms in Serbia (around 50%) offer at least one product-related service. However, the turnover generated by these services is missing in the case of more than 35% companies that offer such services. Furthermore, small firms report notably higher share of sales from product-related services in total turnover than medium and large

companies. It is assumed that the main cause of this differences is the lack of strong service strategy in medium and large-sized firms and closer interaction and collaboration with clients in case of small companies.

The batch size seems to be the most significant determinant of service sales where the modularity of a product and customization imply the need for further assistance – service provision. Furthermore, product complexity and cooperation in new product-related services development are also statistically significant for the differences in the intensity of servitisation.

So far any research studies related to this this topic, case study reports or empirical researches, cover only developed countries. Thus, this paper complements existing studies with evidence for developing country.

Although this analysis presents a representative picture of servitisation trend and its level in Serbian manufacturing firms, further qualitative analyses are needed in order to obtain deeper understanding and interpretations of examined relationships.

## 6. ACKNOWLEDGEMENT

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