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Review article

## TRENDS IN SERVITIZATION: EVIDENCE FROM CROATIA<sup>1</sup>

*Servitization of manufacturing is a hot topic with around 180 publications in top peer reviewed journals. This hype is due to the proclaimed benefits of servitization in terms of increased revenues and better competitive position. However, servitization if not performed correctly can even lead to bankruptcy of a company. So it may be safely said that the servitization strategy is risky. The current literature shows inconsistent results, and there is still no prescription on how to servitize. Research in servitization is still in a nascent phase dominated by case based and exploratory studies rather than testing servitization theory. Most research is done in western developed countries with a clear lack of evidence of the phenomenon in less developed countries.*

*This work contributes to theory by addressing the servitization phenomenon in a less developed country – Croatia. The analysis is performed on three rounds of European Manufacturing Survey (EMS) taken place in years 2009, 2012 and 2015., covering a period of nine years. In this way longitudinal effects of servitization can be researched. So on one side a process of servitization is researched and on the other hand contextual variables*

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*leading to servitization are researched in line with open questions in current literature.*

*The results show that Croatian manufacturers follow trends similar to those in developed western countries, except for provision of advanced services. Current literature advises to provide advanced services. However, advanced services cannot be given without base services and there are important risk issues in provision of advanced services. This work presents a ground for further investigation of servitization, showing the current state of servitization in Croatia and future directions for research.*

*Keywords: Servitization, longitudinal research, service revenues, EMS Croatia, Manufacturing*

## **1 Introduction**

Each manufacturing job in Croatia generates 2.4 jobs in other sectors and manufacturing contributes with 89% of all Croatian exports according to the latest research conducted by Economic institute Zagreb (Palić, 2017). This significant export suggests that Croatian manufacturers are competitive on international markets. Of that export 71% are exported to developed western countries (Europe, Americas) while the other 29% to all other regions, which all demand higher quality (DSZ, 2017).

The most significant contribution in Gross Value Added (GDP) Croatian manufacturing achieved in 2008, but because of the global crisis there was a decline until 2013. Since 2013 manufacturing in Croatia exhibits a raising trend. Therefore, it is interesting to see how Croatian manufacturing companies coped during those unfavorable times.

This study covers the period from 2009 to 2015 in three consecutive survey rounds of European Manufacturing Survey (EMS) taken place in 2009, 2012 and 2015. The success of Croatian manufacturing can be assigned to implementing best practices and one of such best practices is servitization – process of offering a service accompanied by the main product.

Therefore the research question in this work is how Croatian manufacturers offered service, how much service they offered, which services they offered and what results did they achieve and thus contribute to growth.

This work contributes to literature on servitization by using different methodology (survey research as opposed to case studies). Because it is established in Dachs et al. (2014) that more than 80% of European manufacturing is servitized,

there is a clear need for change in research methodology. This change in methodology towards survey based research presents a research gap and this work fills in the gap. This work also contributes to literature by researching a less developed country (Croatia) because the majority of servitization literature researched developed western economies (Sousa and da Silveira, 2017). It adds to theory by a longitudinal research of a period of nine years during unfavorable times thus proving Sands and Ferraro (2010) and Fitzsimmons and Fitzsimmons (2011) assumption that services are not affected by economic downturns.

Implications of this research show the importance of servitization strategy, the servitizing process and accompanied high risks. But, servitization is a necessary operations strategy in today's global competitive market space. Advanced services bring better business and competitive results, but due to high risks this type of advanced service is not widespread, but it certainly presents an opportunity.

This analysis is performed on three consecutive survey rounds of European Manufacturing Survey (EMS) taken place in 2009, 2012 and 2015. The survey is conducted on a three years basis and covers the whole manufacturing sector in terms of NACE classification but covers only manufacturing with over 20 employees because it is believed that manufacturing companies with less than 20 employees do not have formal procedures which are covered by the questionnaire. With descriptive data and an OLS regression analysis hypotheses will be tested. The descriptive data gives an overview of Croatian servitization phenomenon.

## **2. Literature research**

### ***2.1. Definitions and current state***

Servitization is a process in which a manufacturer offers services complementing its products. Manufacturers first start offering base services which necessities more technical know-how and then proceed to more advanced service offerings such as offering a solution to the buyer rather than the buyer owning the manufactured equipment.

The phenomenon of servitization is recently a hot topic and with about 180 publications and books a year (Kowalkowski et al. 2017) and some schools are even offering courses on the subject (Baines et al. 2017).

Adding services to manufacturing is not new, as there is evidence of such cases way back to year 1850. with Singer and McCormik cases described by Schmenner (2009). Simply, Singer and McCormik provided educational services,

repair services, financial services and many more along with the manufactured product (sawing machines - Singer and harvesting equipment - McCormik).

The rationale for adding services by a manufacturer is because services provide in general more stable revenues because they are not affected with economic downturns (Sands and Ferraro, 2010; Fitzsimmons and Fitzsimmons, 2011). Services are attractive because they are characterized by high margins and stable revenues (Brax and Jonsson, 2009; Gebauer & Fleisch, 2007). Added services can promote new equipment sales (Wise and Baumgartner, 1999; Visnjic and Van Looy, 2009). Servitization can strengthen customer relationships, create new revenue streams, and set high barriers for competitors (Baines et al., 2009; 2011). Such integrated solutions are less easy to copy, making them a sustainable source of differentiation (Mathieu, 2001; Oliva & Kallenberg, 2003; Neely, 2008; Chesbrough, 2011). Therefore, it is only logical that services added to manufactured products can make an additional source of revenues (Opresnik et al. 2013), and by this revenues enhance profits. Slepnirov et al. (2010) and Martinez et al. (2010) define servitization as manufacturer's approach to move up the value chain and gain better revenues.

Baines et al. (2017) undertook a large meta-analysis on current servitization literature and as a main obstacle in advancing the field they point to the lack of systemized description of service transition of manufacturing. They reviewed 302 peer reviewed articles and conclude that there are positive outcomes of servitization in developed western economies but virtually no research in less developed countries. But, the investigation of the process of servitization is absent, and yet authors state that without a serious investigation of the process of servitization no prescriptions can be given. Oliva (2016) concludes that even though there is abundance of papers in servitization field, the servitization as a phenomenon is still nascent phase, dominated by exploratory and case based studies with no unified theory and propositions at sight. Sousa and da Silveira (2017) additionally call for more international empirical research to find a universally applicable theory. Kamp and Perry (2017) call for at least finding contextual factors in which servitization is possible. There are problems with this growing literature on servitization. There is no unified theory, no normative or prescriptive advice to manufacturers in pursuing servitization strategy. What's worst, some companies in pursuing a servitization strategy even went bankrupt (Böhm et al, 2017; Benedettini et al. 2017). (Brax, 2005, Gebauer et al., 2004, Neely, 2009) found the so called "service paradox", that is, revenues fall with additional service offering. The service paradox is explained by the fact that a company should reorganize for service provision, otherwise the revenues fall. Even recent studies show that manufacturers fail to realize the anticipated benefits of their servitization strategies (Baines and Lightfoot, 2013; Kreye and Jensen, 2014; van Gool, 2014). Firms servitize but

the returns are not as high as in pure service settings or even share of profits by the pure manufacturing. Fang et al. (2008) in an interesting experiment show that unless companies start to earn 20-30% of revenues by services, the profitability of the servitization strategy is low.

The most cited cases are Rolls Royce (Neely et al., 2011), Nobel Corp. (Schmenner, 2009; Martinez and Turner, 2011), a ship motor company (Slepinov et al., 2010) all generated more than 50% of revenues by services. Those are very high percentages and the question is, are those exceptions or there is really a way manufacturers could generate such high revenues from added services. Additional reason for doubt is recent research by Edvardson et al. (2013) who found that 43% of added services failed. Benedettini et al. (2017) explain this phenomenon by saying that simply adding services without reorganization and introducing service oriented organizational culture in the company, the company will start losing money on added services. Bascavusoglu-Moreau and Tether (2011) and Gebauer et al. (2012) say that servitization is a strategy for survival and not a strategy to enhance revenues or as Kowalkowski et al. (2017) put it: "Services provide a way to escape product commoditisation trap". Kindström and Kowalkowski (2009); Korhonen (2014); Slack et al. (2004) explain that services do not generate anticipated revenues because the management has not put an important emphasis on it and that services manufacturers provide are usually only add-ons and performed ad hoc only to increase product sales.

Whatever reason for servitization (survival or additional stream of revenue), the fact is that the phenomenon is widespread. Research by Dachs et al. (2014) shows that more than 86% of European manufacturing companies are servitized. Mastrogiacomo et al. (2017) show that 37% of manufacturing in Italy is servitized but those are dominantly larger manufacturing companies. Huxtable and Schaefer (2016) show that 61% of UK manufacturing companies are servitized and on average generate 27% share of revenues by services, well below the 50:50 Rolls Royce case. Large percentages of servitized companies call for a change in methodology for exploring servitization towards more survey based methods.

## ***2.2. Hypotheses building***

### *2.2.1 Industrial services*

Services that manufacturing companies usually provide are different than pure services. Those services are coupled to the product. Those services are: design and development services, (ICT) systems and solutions, maintenance and

support services, and installation and implementation services, training, but also financial services, property and real estate services, and consulting (Neely, 2008; Falk and Peng, 2013). Baines and Lightfoot (2013, p. 5) give a very good description of industrial services according to their complexity. They categorize them into base services, intermediate services and advanced services. “Advanced services” (Baines and Lightfoot, 2013) or “result-oriented” (Smith et al., 2014) will yield higher profits. Dachs et al. (2014) report that companies on average generate 13.6% of revenues by services in Europe. Complex products receive 16.6% revenues compared to 10.6% for simple products. However, those advanced services are not yet widespread. Complex products are usually accompanied by manuals so there are higher needs for technical documentation services. Sometimes customers have to be educated on how to use the product or they need help financing their purchase of the product. But those are base services which according to Sousa and da Silveira (2017) have to be given for free or at below cost to promote products sales. Base services will even need investments and thus have negative effect on profitability. But, than there is the question, can a manufacturer of, for example, food products, give advanced services? A manufacturer of systems can provide advanced services to the buyer and taking care of the maintenance of the equipment, but can a food provider give any other service other than new recipes or cooking schools? Therefore, the connection between the complexity of the product and service revenues should be investigated more thoroughly than simple statement obtained by Dachs et al. (2014) that complex products yield higher service revenues. From above discussion, it is hypothesized that advanced services obtain better service returns simply because complex products allow more opportunity for providing differentiating service. Thus, it is hypothesized that complex products enjoy higher share of revenues by service in accordance with Dachs et al. (2014) and Sousa and da Silveira (2017). But, if servitization is not carefully conducted, or simply services are added ad hoc can even diminish financial outcomes of the company (Edvardsson et al., 2013). Taking into account these divergent views we propose the following hypothesis:

H1a: complexity of the product positively influences share of revenues generated by services

### 2.2.2 *Servitization process*

Baines et al. (2017) in their critique of the servitization field especially call for describing the servitization process. Brax and Visintin (2017), Zhang and Banerji (2017) and Kowalkowski et al. (2015) all on their large research show that there is still no prescription theory how to servitize. Thus in the literature there is no prescription how to do it (except Oliva and Kallenberg (2003) advice to form a sepa-

rate unit), and yet companies do it (Kowalkowski et al. 2013). Baines et al. (2017) and Kowalkowski et al. (2015) argue that the servitization process is not linear and incremental, rather balancing capabilities in the company, sometimes causing radical shifts. Except Böhm et al. (2017) and Benedettini et al. (2017) no one researched companies that failed. The majority of companies answering surveys are better performing companies. Some will servitize more successfully and some not. Therefore, it is hypothesized that there is a change in service revenues in time, due to either successful or unsuccessful servitization of the company. Therefore we propose the best case scenario hypothesis:

H2a: Share of revenues generated by services will increase in researched period.

### 2.2.3. *Size of the company*

Size of the company is an important factor. Dachs et al (2014) find that smaller companies benefit more from servitization because it is their way to differentiate from competition. However, this logic is not intuitive because bigger companies could provide more service simply because they have more employees that are able to provide service through the customer support department or office. Mastrogiacomo et al. (2017) show that in Italy, bigger firms are servitized. On the contrary Kowalkowski et al. (2013) show that small companies servitize more successfully. Maybe in smaller companies one employee is doing more jobs and has the knowledge about the product and processes and is thus able to provide a better service. However, Kowalkowski et al. (2015) and Oliva and Kallenberg (2003) suggest to form a separate business unit that will deal with customers and start building the service-dominant culture. That means there has to be more employees with good technical knowledge and good interpersonal skills. Management should put a visible effort in coordinating service provision. It is not enough just to build a separate business unit. One obvious place to start the transition to service dominant logic is through customer service department. Therefore, it is obvious from previous discussion that there is still no agreement do smaller or larger companies benefit from servitization. Small companies benefit from their flexibility, while larger companies benefit from their larger resource base. In both, smaller and larger companies, management has to put greater emphasis on service oriented culture, and one way of showing this is by employing more employees that would serve customers. Therefore, we propose a flowing hypothesis.

H3: Size of the company in terms of number of employees is reversely proportional to the share of revenues generated by services, that is, we hypothesize that smaller companies will enjoy higher shares of revenues by services.

If advice by Oliva and Kallenberg (2003) is accepted then there should be a rise in non-manufacturing jobs in companies to better connect with customers. Therefore a distribution of the workforce would change towards more non-manufacturing jobs. But, on the other hand, if one follows the logic of Kowalkowski et al. (2017) who argument by using Resource based theory that if company does not have human resources to provide services, it will outsource the provision of services. In that case there should be no change in workforce structure in time. But, even if manufacturing companies outsource service provision there is a need for non-manufacturing personnel to coordinate all these activities. Therefore, we propose the following hypothesis:

H4: Share of non-manufacturing personnel in total workforce should increase in researched period

#### *2.2.4 Financial performance*

Dachs et al. (2014) report that companies on average generate 13.6% of revenues by services. This is not a large percentage and is well below the reported case of 50:50 by Rolls Royce, Nobel Corp. and others. So, there is a need to take into account that servitization is done for competitiveness reasons. For example, through servitization companies create high barriers for competitors (Baines et al., 2009; 2011). Servitized solutions are less easy to copy, making them a sustainable source of differentiation (Mathieu, 2001; Oliva & Kallenberg, 2003; Neely, 2008; Chesbrough, 2011). Given that is hard to measure competitiveness one proxy could be net profit before tax. Both Porter's (1985) generic strategies are equally profitable, either differentiation through complex customized products (earning higher margin) or low cost in high volumes (margin spread over more products). Therefore, complexity of the product should not be a predictor of better business performance. Complex products could earn higher shares of revenues by services, but that would, according to Porter's generic strategies, not impact profits because they would have other costs that deplete their revenues.

Therefore, it is hypothesized that:

H1b: complexity of the product does not influence profits before tax.

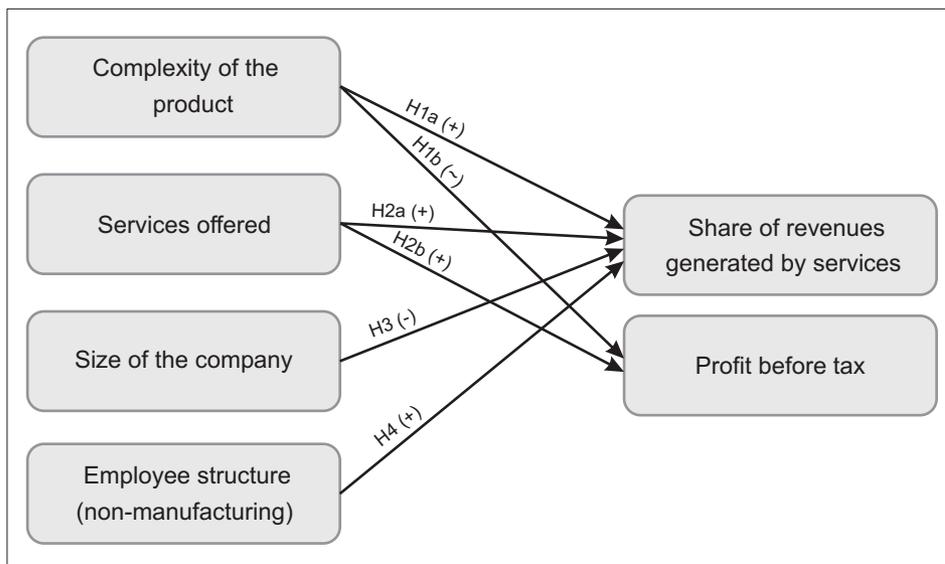
More complex is the product; more additional revenues from services can be generated (Sousa and da Silveira, 2017). But the pure number of offered services does not guarantee profits as concluded by Böhm et al. (2017) and Benedettini et al. (2017). So the question is, which services affect profits negatively, and which services positively affect profits before tax. Since, both complex and simple products do in fact offer the possibility to educate the buyer it is hypothesized that training services will have the highest impact on profits. Therefore we propose the following hypothesis:

H2b: Training/education services will have the highest positive impact on profits before tax in comparison to other services.

Summation of these hypotheses can be described by the following schema:

Figure 1:

PROPOSED RESEARCH FRAMEWORK



The model describes that services and complexity of the product will positively influence both share of revenues generated by services as well as profits with the exception of the link of complexity to profit before tax which is assumed neutral. Size of the company negatively affects share of revenues, while a rise in nonmanufacturing jobs should increase share of revenues generated by services.

### 3 Methodology

#### 3.1. Survey

The data is collected in years 2009., 2012. and 2015. through the European Manufacturing Survey (EMS) Project coordinated by Fraunhofer ISI Institute in Karlsruhe, Germany. The survey is conducted by the Croatian partner of the

EMS – Faculty of Economics and Business Zagreb. The European Manufacturing Survey (EMS) is conducted every three years in countries: Austria, China, Czech Republic, Croatia, Denmark, Finland, France, Germany, Italy, Netherlands, Russia, Slovenia, Spain, and Switzerland. However, for this research only Croatian sample is used. The EMS project researches whole manufacturing sector through a condensed 8 pages questionnaire. The questionnaire has 21 sections and covers, technology, organizational concepts, innovation, servitization and other topics.

The items and scales used as measurement instruments in the EMS study were developed from an extensive review of current literature on manufacturing practices. To ensure the validity of their content, they were reviewed by a panel of experts, bibliographical review and structured interview, and piloted in several plants (Nunnally, 1967). They have also been subject to an analysis for reliability and construct validity through the usual statistical (amongst them: inter-correlation matrixes, Cronbach's alpha (Cronbach, 1951), factor analysis and canonical correlation).

Since the targeted manufacturing companies have over 20 employees in Croatia it was possible to send to the questionnaire to all manufacturing companies without doing any sampling. The questionnaire was sent to Chief Executive Officer and he was asked to authorize the survey. The survey was usually filled in by the Operations manager, with help from accounting as there are questions regarding the financial performance of the company. Two weeks after launching the study, companies that didn't respond were asked to fill the questionnaire or at least to reveal the reason for not doing it. Data gathered by those phone calls enabled to check for the nonresponse bias. Dominant reason for not filling the questionnaire is lack of time. The round in 2009. was sent to 1207 companies. There were 89 valid returned questionnaires, which presents 7% response rate. In 2012, the questionnaire was sent to 1541 companies and 120 valid questionnaires were returned, representing an 8% response rate. In 2015 the questionnaire was sent to 1558 companies and 106 questionnaires were returned yielding 7% response rate. This low response rate is similar in all countries. For each round a check for representativeness according to size and industry is performed and it was valid for all years.

For the purpose of this analysis variables concerning servitization were imported into a new database with the field identifying the year of the data record and that enabled to perform all necessary analyses.

Researched services are: design/consulting/planning, software development, renting equipment, installation, start-up processes, training, maintenance/repair and Build-operate-owner measured as a dichotomous variable – 1 providing the service, 0 not providing the service. Share of revenues by services and profit before tax were objective variables obtained by the bookkeeping department of the

company. In 2015 questionnaire there are more questions on services, especially services provided by aid of digital technology, but those could not be taken into account since they were not present in previous rounds.

### *3.2. Data analysis methodology*

Since there is a lack of longitudinal survey research in servitization, and the topic is important and interesting, the analyses start with descriptive data on servitization process in Croatia. However, to test the proposed model and hypotheses presented in Figure 1., Ordinary least Square (OLS) regression is used with the method “Enter” rather than “Stepwise”. There are several arguments for OLS. Firstly, it distinctively shows the influence of control variables which in this case is complexity of the product, size of the company, and year in which the round was conducted in line with Kamp and Perry’s (2017) call to find contextual factors that enable servitization. The next step was to enter specific services which then show  $\Delta R^2$  change and show the importance of contribution of specific services to the explaining power of the model. In the third step, percentages of workers in five functions were entered (Research and development [%], Configuration, design [%], Manufacturing, assembly [%], Customer service [%], Others [%]) and this third step also provided  $\Delta R^2$  with the accompanying significance of the change. Stepwise OLS was also performed, but since it excludes all insignificant relationship, it is not appropriate here, because it would eliminate nonsignificant but interesting relationships. However, both enter and stepwise OLS regressions give same results for the models. All together six models were performed. Model 1 and 2 use profit before tax as the dependent variable, services and workforce structure were independent variables. The difference between model 1 and 2 is that model 1 covers three rounds, while model 2 looks at the latest (2015) round since there is a considerable change in servitization in the researched period. Model 3 to 4 use share of revenues generated by services as the dependent variable, but Models 3 and 5 use all independent variables, while from Models 4 and 6 workforce structure was excluded as it shows non-significant effects in service provision.

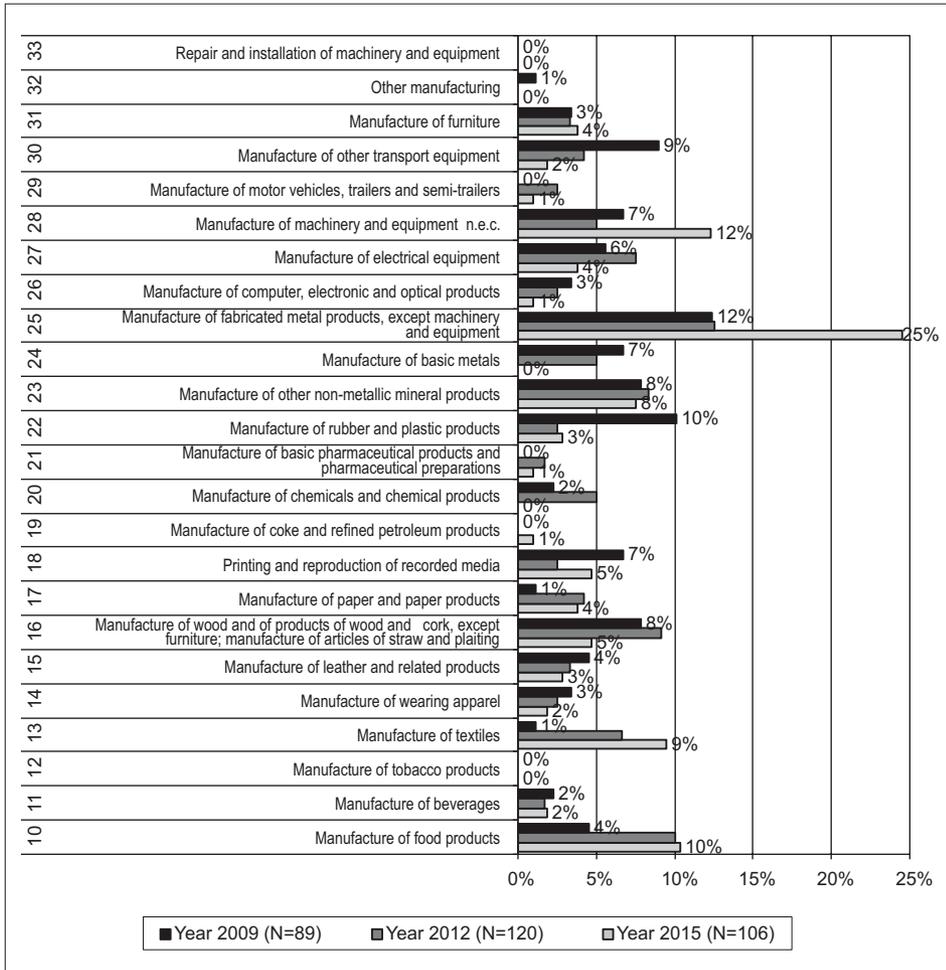
### *3.3. The sample*

The distribution by size of companies in all three rounds are as follows: in 2009, there were 27% of small companies, 37% of small companies in 2012 and 30% of small companies in 2015. Medium sized companies (50 to 250 employees)

were 53% in sample in 2009, 41% in 2012 and 44% in 2015. Large companies (over 250 employees) were 20% in sample in 2009, 23% in 2012 and 25% in 2015.

Figure 2:

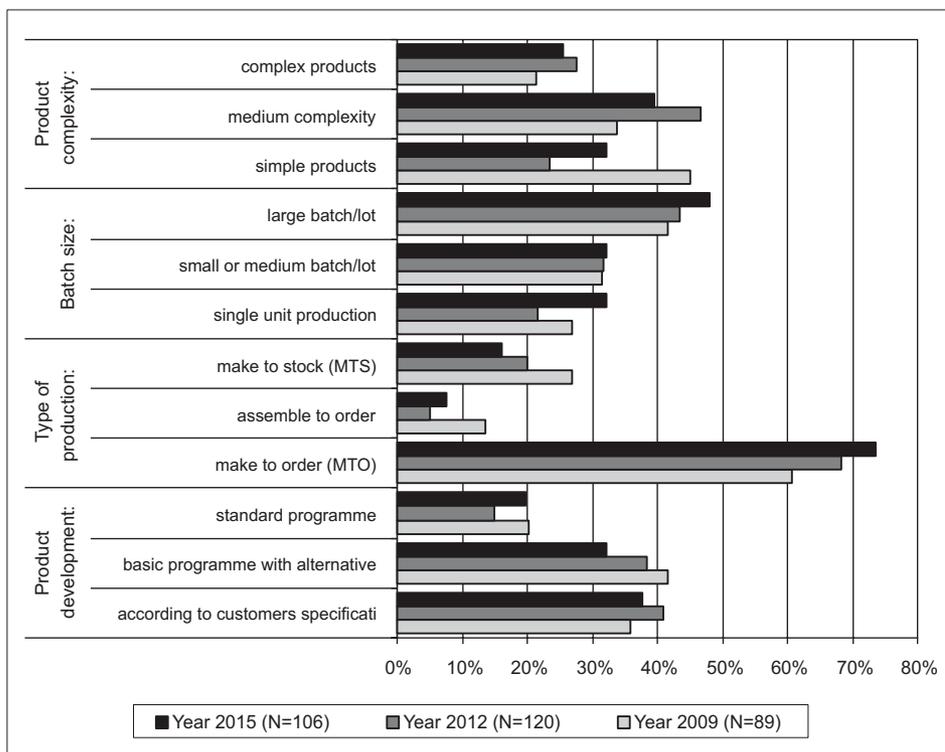
PERCENTAGES OF COMPANIES BY INDUSTRY SECTORS  
 (NACE REV. 2.0) FOR YEARS 2009,2012 AND 2015.



Source: EMS Croatia (2009, 2012, 2015)

Figure 3:

MANUFACTURING CHARACTERISTICS OF CROATIAN  
 MANUFACTURERS IN YEARS 2009, 2012 AND 2015.



Source: EMS Croatia (2009, 2012, 2015)

The distribution by industries is presented in Figure 2. In Figure 3. characteristics of Croatian manufacturing is presented. It can be observed that there is a decrease in batch size and an increase in make to order production, showing a shift towards more customised production.

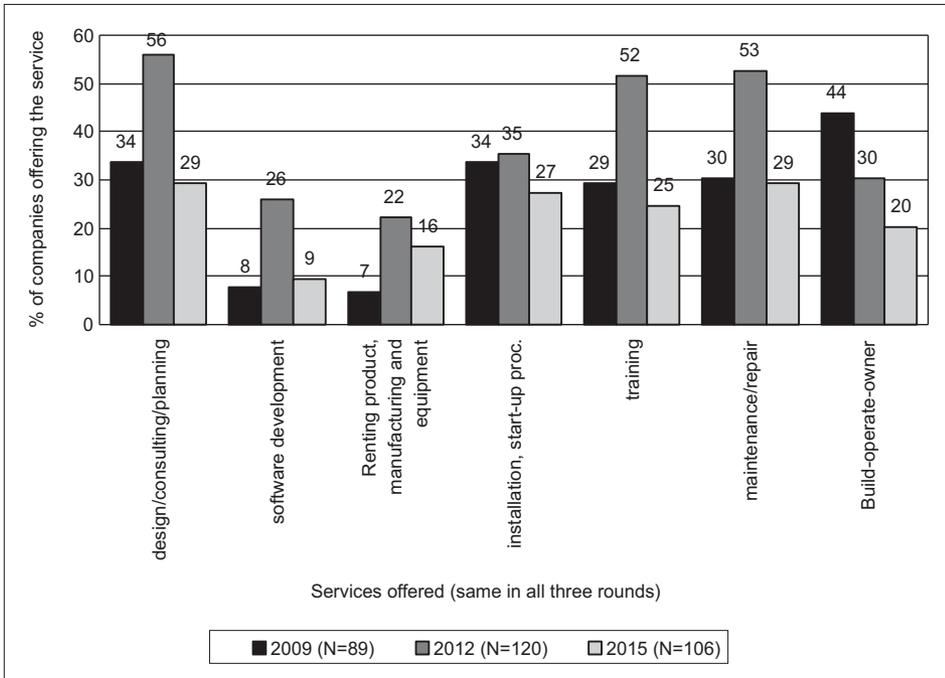
3.4 Descriptive statistics

In all three years the distribution of servitized companies was 71% in 2009., 79% in 2012 and 72% in 2015. This result was obtained by selecting companies

that provide at least one service. One note is in order here. In this work only services presented in all three rounds are explored. But questionnaires in each round are heavily grounded in literature and expert panels. So for example, in rounds 2009 and 2012, technical documentation and leasing were present but are excluded from round 2015 since almost all companies provide them. In the 2015, additional services and variations of advanced services were offered. Figure 4 shows percentages of companies offering services that were present in all three rounds. The responders had to check if they provide this service.

Figure 4:

PERCENTAGES OF COMPANIES OFFERING SERVICES  
 IN YEARS 2009, 2012 AND 2015.



Source: EMS Croatia (2009, 2012, 2015)

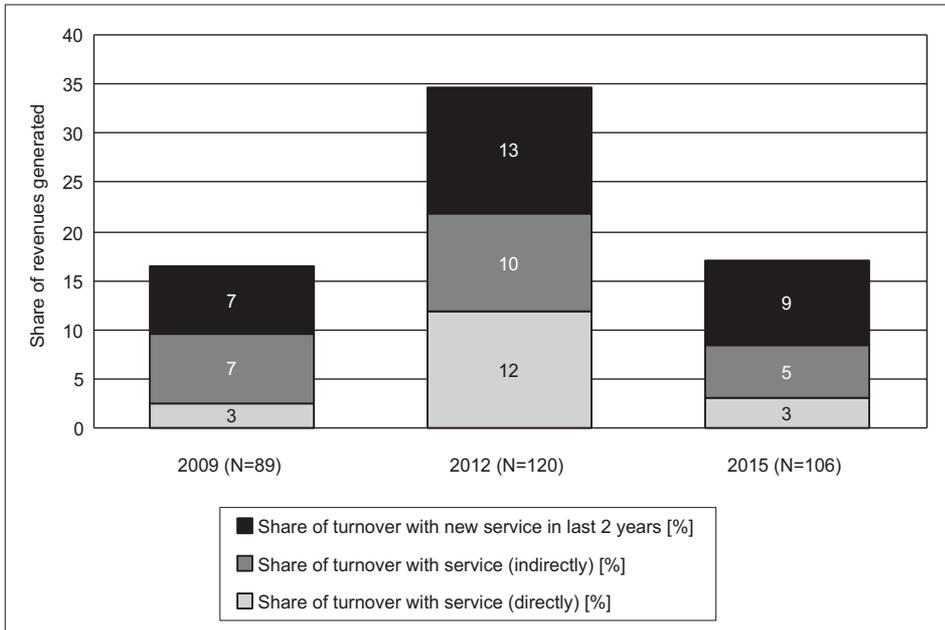
Two important insights can be obtained by this analysis. In line with Sands and Ferraro (2010) and Fitzsimmons and Fitzsimmons (2011) services are an important value generator in economic downturns. Since 2009, Croatia was hit by severe recession and that might explain the raise in service offering in 2012. That

still doesn't mean that companies profited by this strategy rather that more companies provided those services. In 2015 there is a decline of offered services. Service "Build – operate – own" is the most advanced service (the kind Rolls Royce offers) is steadily declining. Before entering into reasons of that decline, it has to be mentioned that in the 2015 questionnaire many more digitally enabled services were researched but could not be taken here into account due to comparability with three surveys rounds. The decline of advanced services is especially worrying since literature suggests that this is the only source of significant share of service revenues (Sousa and da Silveira, 2017) and that other services must be provided for free or below cost. The decline in advanced services in Croatia is probably due to the risk that concerns this advanced service contracts. Erkoyuncu et al. (2013) list all risks: operational risks, risks regarding maintenance, risk of not having enough field employees at a specific moment, risk of lack of education of employees, or not enough engineers. Financial risks are that the client will not be able to afford that product after all, business uncertainties as volatility of interest rates, volatility of price of incoming material, wage raises, inflation. Finally there is also a risk that there is no demand for client's products that certainly most profoundly affects such service contracts.

Figure 5 shows that there is a significant rise in share of service revenues from 2009 to 2012. But in 2015 share of service revenues fell to those at the levels of 2009. One possible explanation may be that in 2012, Croatia was still hit severely by recession and maybe manufacturing companies looked for alternative sources of income. However, lacking adequate organisational capabilities companies started to deservitize as explained by Valtakoski (2017) and Kowalkowski et al. (2017). Deservitization does not mean that the companies do not offer services rather they outsourced service provision because they do not have capabilities inside the company which Kowalkowski et al. (2017) argument by using Resource based theory. This out contracting service provision is documented in Prester et al. (2017). T test shows a significant decrease in revenues in 2015. in comparison to year 2012.

Figure 5:

**SHARE OF REVENUES FROM SERVICES  
IN YEARS 2009, 2012 AND 2015.**



Source: EMS Croatia (2009, 2012, 2015)

Table 1. describes share of revenues generated by the main manufactured product, by services and by innovation.

Table 1.

**SHARE OF REVENUES GENERATED BY THE MAIN MANUFACTURED  
PRODUCT, BY SERVICES AND BY INNOVATION**

Year	Share of turnover with main product [%]	Share of turnover with services [%]	Share of turnover generated by new products [%]	Return on sales before tax*
2009	81.16	14.88	28.76	0.24
2012	72.08	22.08	15.72	1.46
2015	57.58	12.78	26.85	3.11

Source: EMS Croatia (2009, 2012, 2015)

\* Legend: 1(0-2% of revenues), 2 (>2-5% of revenues), 3 (>5-10% of revenues), 4 (>10% of revenues)

From Table 1. it can be observed that share of revenues by the main product is declining. Share of turnover by services in 2015. fell under the level of year 2009. Innovation slightly rose since 2012. But return on sales before tax steadily rises, meaning that despite the declining revenues companies are performing better.

When comparing means there is a steady rise in service personnel but the differences are not statistically significant. In 2009, 5.6% of workforce was in customer service. That rose to 8.65% in 2012. and rose again to 9.43% in 2015. There is also a rise in non-manufacturing jobs in the companies, but as with customer service, this significance by the t-test is not statistically significant at level  $p < 0.01$ .

*Table 2.*

WORKFORCE DISTRIBUTION IN YEARS 2009, 2012 AND 2015.

	2009	2012	2015
Share of Staff in R&D (% of total workforce)	3.65	3.95	3.38
Design (% of total workforce)	5.04	3.74	4.53
Production (% of total workforce)	62.56	66.13	64.22
Customer service (% of total workforce)	5.6	8.65	9.43
Other (% of total workforce)	16.07	17.62	18.37

Source: EMS Croatia (2009, 2012, 2015)

The more complex is the product, the more revenues from services can be achieved. Complex services achieve higher share of revenues from services billed directly. The same analysis was performed on all three rounds and the main difference in this analysis is that in 2015 there is also a significantly higher share of indirectly billed services.

Table 3.

SHARE OF REVENUES GENERATED BY SERVICES ACCORDING  
TO COMPLEXITY OF THE PRODUCT

		2009	2012	2015
Share of turnover with service (directly) [%]	Simple	1.5	1.5	1.4
	Complex	4.2***	19.5***	7.3***
Share of turnover with service (indirectly) [%]	Simple	4.3	6.2	1.9
	Complex	8.1	9.8	8.9***
Share of turnover with new service in last 2 years [%]	Simple	3.4	13.33	9.2
	Complex	10.7	13.56	8

The table displays Standardised Beta coefficients, \*\*\* mean  $p < 0.001$ , \*\*  $p < 0.01$

Source: EMS Croatia (2009, 2012, 2015)

Thus it can be concluded that more complex products, not only yield higher shares of revenues but they can also be billed directly. So complex products give a higher possibility to offer services, and this possibility then allows giving advanced services in accordance with Sousa and da Silveira (2017).

Size of the company in terms of number of employees influences share of revenues generated by services. According to theory larger companies can achieve more benefits from servitization simply because of larger number of employees. Performing T test for differences in means it is obtained that large companies (250 employees and more) actually have lower revenues from new services in 2012, and smaller share of revenues for indirectly billed services in 2015. Table 4 describes shares of revenues according to the size of the company in terms of number of employees.

Table 4.

SHARE OF REVENUES GENERATED BY SERVICES ACCORDING  
 TO SIZE OF THE COMPANY

Share of revenue	Size	2009	2012	2015
Share of turnover with service (directly) [%]	20-49	2.67	14.20	5.86
	50 - 249	2.33	9.21	2.64
	>250	3.06	13.38	1.40
Share of turnover with service (indirectly) [%]	20-49	5.85	12.73	10.32
	50 - 249	1.61	10.72	5.03
	>250	6.92	4.76	1.22**
Share of turnover with new service in last 2 years [%]	20-49	9.42	16.11	9.68
	50 - 249	1.14	15.83	7.88
	>250	10.33	3.17**	8.17

The table displays Standardised Beta coefficients, \*\*\* mean  $p < 0.001$ , \*\* $p < 0.01$

Source: EMS Croatia (2009, 2012, 2015)

Since the test established a statistically significant difference in revenues between different sizes of companies (although only for new service revenues in 2012 and indirectly billed services in 2015.) it can be concluded that in accordance to Mastrogiacomo et al. (2017) and Dachs et al. (2014). that smaller companies have higher shares of revenues for services, even though not all differences are statistically significant at level  $p < 0.01$ .

## 4 Results

### 4.1. Results of the OLS regression analysis

All together six models were performed. Model 1 and 2 use profit before tax as the dependent variable, services and workforce structure were independent variables. The difference between Model 1 and Model 2 is that Model 1 covers three rounds, while Model 2 looks at the latest (2015) round since there is a considerable change in servitization in the researched period. Model 3 to 6 use share of revenues generated by services as the dependent variable, but Models 3 and 5 use all independent variables, while from Model 4 and 6 workforce structure was excluded as it shows non-significant effects. The models are presented in Table 5 and it is used to answer all six hypotheses and show additional insights. All means and correlations are provided in the Appendix of the text.

Table 5. RESULTS FROM REGRESSION ANALYSES, MODEL 1 TO 6

Model	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Profits before tax 3 rounds	Stand. Beta	Profits before year 2015	Stand. Beta	Service revenues3 rounds	Stand. Beta	Service revenues3 rounds	Stand. Beta	Service revenues 2015	Stand. Beta	Service revenues 2015	Stand. Beta
(Constant)												
no of employees	0.001		-0.089		-.174		-.171		-0.068		.041	
complexity	-0.107		-0.078		.128		.146		-.510		-.243	
year	0.196***				.138		.085					
$\Delta R^2$ (Sig)	0.033 (0.041)		0.014 (0.520)		0.097 (0.021)		0.087 (0.029)		0.041 (0.684)		0.041 (0.684)	
installation, start-up proc.	0.118		0.006		-0.14		-0.08		-0.26		-0.47	
maintenance/repair	0.015		-0.188		-0.055		-0.23		-0.276		.104	
training	-0.069		-0.252		0.279**		.302		.401		.234	
design/consulting/planning	-0.119		-0.037		.103		.141		-.353		-.266	
software development	0.092		0.301**		-.185		-.129		.327		.381	
Renting equipment	-0.155**		0.015		.163		.120		.341		.254	
Build-operate-owner	0.063		0.259**		-0.054		-0.035		.486		.408	
$\Delta R^2$ (Sig)	0.048 (0.023)		0.14 (0.089)		0.101 (0.027)		0.121 (0.14)		0.680 (0.038)		0.680 (0.038)	
Research and development [%]	0.042		0.683		-1.607				.152			
Configuration, design [%]	0.04		1.146**		-1.742				.455			
Manufacturing, assembly [%]	0.062		3.295**		-5.016				.173			
Customer service [%]	0.119		2.305**		-2.751				.113			
Others [%]	-0.086		2.466**		-3.557				-.198			
$\Delta R^2$ (Sig)	0.027 (0.023)		0.1 (0.029)		0.033 (0.074)				0.122 (0.081)			
R	0.328		0.503		0.475		0.448		0.918		0.849	
Rsquare	0.108		0.254		0.226		0.201		0.844		0.077	
F	2.05		1.989		1.752		2.602		2.904		3.168	
Sig	0.015		0.029		0.06		0.01		0.081		0.038	

The table displays Standardised Beta coefficients, \*\*\* mean  $p < 0.001$ , \*\*  $p < 0.01$

Source: EMS Croatia (2009, 2012, 2015)

**4.2. Hypotheses testing results**

Table 5. now gives results that provide grounds for hypotheses testing even though the descriptive results already gave an overview of servitization trends in Croatia. To argument hypotheses confirmation or rejection hypotheses are presented in Table 6.

Table 6.

SUMMATION OF HYPOTHESES

H1a: complexity of the product positively influences share of revenues generated by services	Partially supported in three rounds, not supported in last 2015 round
H1b: complexity of the product does not influence profits before tax.	Supported
H2a: Share of revenues generated by services will increase in researched period.	Partially supported
H2b: Training/education services will have the highest positive impact on profits before tax in comparison to other services.	Not supported for profit before tax, but supported for share of service revenues
H3: Size of the company in terms of number of employees is reversely proportional to the share of revenues generated by services	Partially supported, because of the signs, but are not statistically significant
H4: Share of non-manufacturing personnel in total workforce should increase in researched period	Partially supported because they significantly positively increase profit before tax but do not statistically significantly increase share of service revenues

Models 1,2,4 and 6 are significant and represent the sample considered. Model 1 shows that the profit before tax significantly rises in these three consecutive rounds. It was expected that services would contribute to profits in those crises times, but they didn't and in fact during those times service of Renting equipment was a negative burden on profit. The service was probably offered below the real costs just to surpass hard times. However, Model 2 gives an excellent overview of current state of manufacturing. Services such as software development significantly adds to profit before tax, and those few companies that do give advanced service of "Build-operate-owner" generate significant portion of profit before tax. All employees significantly contribute to positive and significant business results

except for employees in R&D, but that is understandable, because R&D investments are generally funded by profits.

Training services (Model 3 on all three rounds), show that this is the only service that increases share of service revenues. This could be an additional source of income and would contribute to profits. Those services are billable services (either directly or indirectly) and present a stream of revenues. But, if one looks in row "Training" under Model 1 and Model 2 (Profit before tax) we see a nonsignificant and negative sign. That means that in fact companies are not profiting from these services, even though, they generate revenues. This might be maybe explained by the fact that employees giving those training should prepare for lectures and are away from the company while giving lectures, thus not contributing to the company.

Interestingly the distribution of the workforce has no impact on service revenues. It even gives a nonsignificant model (Model 5). This is contrary to Oliva and Kallenberg (2003) advice to form a separate unit and build client supportive organizational culture. Model 4 presents the same regression without distribution of the workforce as separate variables. The whole model than becomes significant but the only positive non-significant contributions to revenues are training, design/consulting and renting equipment. Model 6 presents the same analysis but only on last round in 2015. Their positive but non-significant effects on share of revenues from services are obtained by maintenance and repair, training, renting equipment and build and operate services. These services increase share of revenues generated by services but not statistically significantly.

## 5 Discussion

Hypothesis H1a that complex products yield better service revenues is not supported in the last 2015 round and this might be because even manufacturers of simple products do provide services as a means of differentiation. But as Sousa and da Silveira (2017) find, those services are today even given for free or at below costs and this might be a reason why this hypothesis is not confirmed. Hypothesis H1b is more in line with Porters generic strategies that differentiation and cost leadership are both equally profitable strategies so the hypothesis that complexity of the product does not influence profits before tax (differentiation) was supported. Hypothesis H2a that Share of revenues generated by services will increase in researched period, is only partially confirmed because indeed there was a raise in service revenues in 2012 in comparison to 2009, but in 2015 the service revenues fell and this might be explained by the new phenomenon raised

by Valtakoski (2017) and Kowalkowski et al. (2017) which they call deservitization. Deservitization simply means that since companies do not usually have the necessary capabilities to provide the service, they outsource the provision of service and thus this fall in service revenues, because those revenues now go to the provider of service. Servitization in Croatia is stable; around 70% of companies in all three rounds offer at least one service. The hypothesis H2b that Training/education services will have the highest positive impact on profits before tax in comparison to other services was not supported. This service in fact generates greatest share of revenues by services in comparison to all other services but it negatively affects profit before tax. This finding is in line with Böhm et al. (2017) and Benedettini et al. (2017) that servitization sometimes even hurts financial performance of the servitized company if not done correctly. Hypothesis H3 that the size will affect service revenues is only partially supported because the signs are in right (hypostasized) direction but are non-significant. Smaller companies being more flexible are able to generate higher rates of share of service revenues. The finding that smaller companies obtain better shares of revenues from services is in accordance with findings of Kowalkowski et al. (2013) and Dachs et al. (2014) but contrary to findings of Mastrogiacomo et al (2017) on Italian servitized companies. This hypothesis then contributes to further conundrum of the effect of size of the company on servitization. Hypothesis H4 is in line with Oliva and Kallenberg (2003) who propose to form a separate unit to work with customers. However, they warn that just forming a new separate unit will not solve servitization problems. Employees of the manufacturing company have to be well coordinated to provide a solution to the customers. They also state that employees in this service dominant company have to learn people skills in dealing with customers which is not always easy. Confirming Oliva and Kallenberg (2003) advice, there is a rise in customer service share of employees in three consecutive EMS rounds. There is also a rise in the category of employees "Other". Kamp and Perry (2017) for example say that manufacturers should better market their service offering. Maybe in the category "Other" are also marketing employees.

In this work it is hypothesized that actually only producers of complex products are able to provide advanced services. Results indicate a decline of advanced services in Croatia and this decline is explained by risks accompanied by such advanced services (Erkoyuncu et al. (2013)). However, it was proven that manufacturers of complex products do in fact obtain higher shares of revenues by services. Set-up and installation significantly positively affect profit before tax. Such work is needed only for complex products and systems. However, the link between complexity of the product and advanced services should be further explored, especially because there is tendency by manufacturers to offer digitalised services (Huxtable and Schaefer, 2016). In Croatian setting, the most significant positive relationship to service revenues are training services.

Trends in Croatian servitization showed an increase in 2012. but a decline again in 2015. That was explained by the fact that probably due to the unfavourable business conditions Croatian manufacturers turned to services as a strategy advocated by Sands and Ferraro (2010) and Fitzsimmons and Fitzsimmons (2011), but followed the trend of deservitization in 2015. that is outsourcing service provision in line with Valtakoski (2017) and Kowalkowski et al. (2017).

## 6 Conclusion

### 6.1 *Contribution to the literature*

Baines et al. (2017) and Kowalkowski et al. (2017) on grounds of their research conclude that there is still no unified theory about how the servitization process is or should be conducted. This is important for scientists that research the phenomenon, but is also important for practitioners that would benefit from prescriptions. This work contributes to the literature on servitisation raised by Sousa and da Silveira (2017) for more international empirical studies, because the majority of research is conducted in developed western countries. This work shows the servitization development in a less developed country (Croatia). Croatia is specifically interesting because it is believed that the majority of Croatian GDP comes from tourism and because of a popular belief in Croatia that in Croatia there is no manufacturing left. That is absolutely a false belief because according to DSZ (2017a) manufacturing contributes to GDP with 12.6% (Nace code C), while the Nace code "I Accommodation and food service activities" generate only 4.6%.

This work also contributes to investigating the servitization process by taking into accounts three EMS survey round all together researching a nine year period in Croatian manufacturing. There is a lack of longitudinal survey research on servitization and especially in this period when the world crisis hit all countries. This research proves the validity of Sands and Ferraro (2010) and Fitzsimmons and Fitzsimmons (2011) assumption that services are not affected with economic downturns.

This research contributies to current literature on disagreement how size of the company influences servitization accordance with findings of Kowalkowski et al. (2013) and Dachs et al. (2014) but contrary to findings of Mastrogiacomo et al. (2017). Probably small companies do benefit from higher flexibility, but larger companies profit from larger resource base.

Sousa and da Silveira (2017) state that advanced services (such as build to operate) can significantly contribute to share of service revenues but they cannot be

provided without base services (such as technical documentation) which is sometimes given for free or at below cost. In this work, especially Models 2 show that advanced services software development and (build-operate-owner) significantly increases profits before tax.

On the other hand, complexity of the product as a contextual variable is not researched in current literature, rather the “advancedness” of the service. It is shown that manufacturers of complex products do generate higher shares of revenues by services. Finally, this work adds to literature by proving the existence of the new phenomenon called deservitization, Valtakoski (2017) and Kowalkowski et al. (2017) explain that deservitization does not mean that the companies do not offer services rather they outsourced service provision because they do not have capabilities inside the company. This is backed up by Resource Based View (RBV) and Transaction Cost Theory (TE). If a company does not have resources inside the company, it looks for resources outside the company. Or, according to TE, it outsources service provision because it is cheaper than doing it from its own resource base. This, in fact, poses a new direction for research, that is, what new services manufacturers provide and who they cooperate with in provision of advanced services. Do companies cooperate more with service providers of digital technology and is Croatian manufacturing also entering this arena of Industry 4.0. through providing digitalized service offerings with their products?

### ***6.2. Limitation of the study***

There is a limitation to this study in sense that it only explores manufacturing in Croatia. Even though results are consistent with current literature from the western developed economies, it would be interesting to see the trends in other countries. Further limitation is that only services presented in all three-survey rounds were explored. There are many additional questions about servitization in 2015. questionnaire including advanced and digitalized services. This, thus, presents opportunity for further research on servitization.

### ***6.3. Management implications***

This research shows that Croatian manufacturers are well aware of necessity of providing services along with the manufactured product. Those that do not offer services yet should start to think in that direction. But, as literature suggests, sim-

ply ad hoc giving services is not advised. The service provision should be planned. Cost benefit analyses should also be performed, before offering services, because not all services are equally profitable for a manufacturing company. Current literature suggests that base services are usually given for free and at below cost, but can increase product sales. The best financial impact is accomplished by advanced services. On the other hand, advanced services cannot be given before being able to provide base services. Thus, manufacturers should work on their overall excellence so that the risks associated with providing advanced services diminished. Maybe this is only a peculiarity for Croatian manufacturing but training services add most to share of service revenues, but again managers have to be careful because these services do not contribute to profit before tax.

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## Appendix:

*Means, Std. deviations, N, Pearson Correlations, Model 1, 2,3 and 4*

MODEL1	Mean	Std.Deviation	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1 Return on sales before tax	2,49	1,43	253	1,000																
2 noofemployee	1,94	,732	253	-0,023	1,000															
3 complexity	1,91	,756	253	-0,059	0,155**	1,000														
4 year	2012	2,47	253	0,163***	0,035	0,094	1,000													
5 installation, start-up proc.	3,4	4,76	253	0,025	0,04	0,304***	-0,083	1,000												
6 maintenance/repair	-3,9	8,83	253	0,026	-0,011	0,124**	0,116**	0,092	1,000											
7 training	,56	4,81	253	-0,078	-0,003	0,294***	-0,056	0,411***	0,099	1,000										
8 design/consulting/planning	4,0	4,90	253	-0,107**	0,004	0,147**	-0,052	0,385***	0,003	0,354***	1,000									
9 software development	,15	,538	253	0,019	-0,024	0,21***	0,011	0,371***	0,061	0,4***	0,362***	1,000								
10 Renting equipment	,17	,373	253	-0,115**	0,068	0,164***	0,097	0,303***	0,055	0,33***	0,269***	0,348***	1,000							
11 Build-operate-owner	,32	,466	253	-0,013	-0,023	0,292***	-0,203***	0,313***	-0,106**	0,358***	0,252***	0,214***	0,245***	1,000						
12 Research and development [%]	4,12	5,75	253	0,003	-0,158**	0,162***	-0,08	0,14**	0,047	0,21***	0,181***	0,32***	0,172***	0,178***	1,000					
13 Configuration, design [%]	5,011	6,91	253	0,021	-0,04**	0,183***	-0,085	0,237***	0,079	0,235***	0,181***	0,232***	0,039	0,146**	0,362***	1,000				
14 Manufacturing, assembly [%]	64,77	19,15	253	0,039	0,049	-0,057	-0,042	-0,088	-0,046	-0,139**	-0,122**	-0,2***	-0,178***	-0,051	-0,417***	-0,31***	1,000			
15 Customer service [%]	8,22	11,40	253	0,107**	0,039	-0,002	0,119**	0,044	0,03	0,04	0,014	0,052	0,128**	0,088	0,048	-0,066	-0,272***	1,000		
16 Others [%]	17,89	13,87	253	-0,149**	0,017	-0,074	0,033	-0,084	-0,02	-0,037	-0,012	0,004	0,043	-0,14**	-0,057	-0,158**	-0,61***	-0,081	1,000	

*Model 2*

	Three rounds	Mean	Std. Deviation	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	Service revenues [%] of total sales	24,90	29,34	100	1,000																
2	noemployee	1,90	0,75	100	-0,134	1,000															
3	complexity	2,00	0,77	100	0,234**	0,089	1,000														
4	year	2010,92	2,43	100	0,141	0,023	-0,033	1,000													
5	installation, start-up proc.	0,46	0,50	100	0,134	0,097	0,158	0,089	1,000												
6	maintenance/repair	-1,44	14,02	100	0,016	-0,017	0,197**	0,118	0,141	1,000											
7	training	0,48	0,50	100	0,349**	0,049	0,368**	0,106	0,318**	0,155	1,000										
8	design/consulting/planning	0,56	0,50	100	0,17**	0,071	0,026	0,229**	0,252**	0,028	0,247**	1,000									
9	software development	0,20	0,40	100	0,093	-0,034	0,197**	0,192**	0,291**	0,082	0,32**	0,292**	1,000								
10	Renting equipment	0,14	0,35	100	0,217**	0,016	0,189**	0,109	0,206**	0,071	0,305**	0,183**	0,375**	1,000							
11	Build-operate-owner	0,49	0,50	100	0,094	-0,057	0,184**	-0,083	0,099	-0,13	0,219**	0,143	0,11	0,296**	1,000						
12	Research and development [%]	4,50	12,33	100	0,156	-0,008	0,262**	0,036	0,155	0,04	0,171**	0,149	0,302**	0,129	0,097	1,000					
13	Configuration design [%]	4,98	12,61	100	0,165	-0,029	0,292**	0,038	0,198**	0,065	0,206**	0,156	0,216**	0,042	0,151	0,835**	1,000				
14	Manufacturing, assembly [%]	60,37	25,10	100	-0,027	-0,028	-0,029	-0,037	-0,041	-0,074	-0,06	0,056	-0,248**	-0,113	0,098	0,342**	0,335**	1,000			
15	Customer service [%]	8,09	15,25	100	0,119	-0,016	0,065	0,095	0,132	0,032	0,059	0,028	0,078	0,144	0,065	0,659**	0,595**	0,178**	1,000		
16	Others [%]	16,14	17,73	100	-0,003	0,035	-0,041	0,186**	0,005	-0,031	0,094	0,064	0,092	0,057	-0,038	0,506**	0,515**	0,107	0,386**	1,000	

## Model 3

	Mean	Std. Deviation	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Return on sales before tax	3,14	1,208	97	1,000														
2 noofemployee	1,97	,770	97	-0,107	1,000													
3 complexity	1,94	,775	97	0,043	0,049	1,000												
4 installation_start-up_proc.	,28	,451	97	0,117	-0,095**	0,259**	1,000											
5 maintenance/repair	,31	,465	97	0,05	-0,206	0,227	0,679***	1,000										
6 training	,26	,440	97	-0,051	-0,099	0,139	0,37***	0,524***	1,000									
7 design_consulting/planning	,28	,451	97	-0,017**	0,025	0,05**	0,384***	0,331***	0,318***	1,000								
8 software_development	,10	,306	97	0,213	-0,163	0,203	0,395	0,56	0,42**	0,319	1,000							
9 Renting equipment	,16	,373	97	-0,053**	-0,018	,000	0,158***	0,063***	0,183***	0,158**	0,032**	1,000						
10 Build-operate-owner	,21	,407	97	0,257	-0,112	0,239	0,423	0,486	0,282**	0,252	0,246**	0,117	1,000					
11 Research and development [%]	3,41	4,771	97	0,047**	-0,111	0,167**	0,069**	0,086***	0,198***	0,121***	0,242**	-0,025	0,155**	1,000				
12 Configuration, design [%]	4,585	5,8734	97	0,169	-0,098	0,241	0,389	0,441	0,393	0,28**	0,239	-0,055	0,237	0,383***	1,000			
13 Manufacturing, assembly [%]	63,46	20,488	97	0,024	0,049	0,052	-0,109	-0,055	-0,107	-0,179	-0,139	-0,088	-0,14**	-0,301	-0,097	1,000		
14 Customer service [%]	9,71	14,102	97	0,08	0,129	0,010**	0,092	0,083**	-0,03	-0,077	0,021	0,109	0,225	0,022	-0,109**	-0,245***	-0,098**	1,000
15 Others [%]	18,76	15,804	97	-0,153***	-0,109***	-0,195***	-0,088***	-0,175***	-0,023***	0,148***	0,001***	0,03***	-0,135***	-0,07***	-0,245***	-0,634***	-0,098***	1,000

*Model 4*

	Mean	Std. Deviation	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Service revenues [%] of total sales	15,67	21	1,000														
2	noemployee	1,95	0,80	21	-0,161	1,000												
3	complexity	1,81	0,81	21	0,126	-0,015	1,000											
4	installation, start-up proc.	0,57	0,51	21	0,296***	0,07	0,035	1,000										
5	maintenance/repair	0,57	0,51	21	0,373**	-0,053	0,156	0,417	1,000									
6	training	0,48	0,51	21	0,493	0,179	0,349**	0,055	0,44	1,000								
7	design/consulting/planning	0,67	0,48	21	-0,013**	0,086	-0,424	0,204	,000	0,067**	1,000							
8	software development	0,29	0,46	21	0,531**	-0,23**	0,284	0,335	0,335	0,452	0,224	1,000						
9	Renting equipment	0,10	0,30	21	0,531***	-0,393	-0,126	0,281	0,281***	0,015	-0,115	0,154	1,000					
10	Build-operate-owner	0,43	0,51	21	0,63	-0,07	0,208	0,361	0,556	0,33	0,204	0,304**	0,75	1,000				
11	Research and development [%]	4,81	6,16	21	0,196	-0,113	0,362	0,117	0,213**	-0,002	0,062	0,423	-0,044	0,107	1,000			
12	Configuration, design [%]	6,71	7,41	21	0,335	0,19	0,339	0,165	0,458	0,301	0,014	0,244	-0,301	0,141	0,344	1,000		
13	Manufacturing, assembly [%]	54,38	18,42	21	0,016	0,106	0,075	0,109	0,141	0,017	0,043**	-0,265	0,101	0,051	-0,083	0,029	1,000	
14	Customer service [%]	10,43	15,09	21	0,13	0,01	0,145**	0,149	0,169**	-0,215	-0,432	0,025	0,566	0,275	-0,116	-0,188	-0,304***	1,000
15	Others [%]	23,67	21,16	21	-0,281***	-0,133***	-0,393***	-0,294***	-0,466***	0,034**	0,248**	0,005***	-0,168***	-0,321**	-0,256***	-0,341**	-0,349**	1,000

TRENDOVI U PRUŽANJU POPRATNIH USLUGA OD STRANE PROIZVOĐAČA:  
HRVATSKI KONTEKST

## Sažetak

Servitizacija proizvodnje (nuđenje popratnih usluga od strane proizvodnih poduzeća) je aktualna tema s oko 180 publikacija u vrhunskim recenziranim časopisima. Razlog ovako velikom broju publikacija je zbog teoretskih koristi nuđenja popratnih usluga proizvodnim poduzećima u smislu povećanja prihoda i bolje konkurentske pozicije. Međutim, nuđenje popratnih usluga ako se ne provede ispravno može čak dovesti do stečaja tvrtke. Stoga se može reći da je strategija nuđenja popratnih usluga riskantna i treba je bolje istražiti. Trenutna literatura pokazuje nedosljedne rezultate i još uvijek nema preporuka kako provesti nuđenje popratnih usluga u poduzeću. Istraživanje nuđenja popratnih usluga od strane proizvodnih poduzeća još je uvijek u fazi razvoja, što se može zaključiti po tome da dominiraju studije slučaja i deskriptivne statistike fenomena, a ne testiranje teorije pružanja popratnih usluga. Većina se istraživanja provodi u zapadnim razvijenim zemljama s jasnim nedostatkom dokaza o fenomenu u manje razvijenim zemljama.

Ovaj rad doprinosi literaturi objašnjavanjem fenomena nuđenja popratnih usluga od strane proizvodnih poduzeća u manje razvijenoj zemlji - Hrvatskoj. Analiza se provodi u tri kruga Europskog istraživanja proizvodnje (EMS) koja su provedena u 2009., 2012. i 2015., a obuhvaćaju razdoblje od devet godina. Na taj se način istražuju longitudinalni učinci nuđenja popratnih usluga. Tako se s jedne strane istražuje sam proces, a s druge strane kontekstualne varijable koje djeluju pri pružanju popratne usluge, odnosno, daje se odgovor kada ta strategija nije ili jest uputna. Ovo istraživanje prikazuje hrvatski kontekst pružanja popratnih usluga odgovarajući na trenutno najaktualnija pitanja iz tog područja.

Rezultati pokazuju da hrvatska proizvodnja slijedi trendove slične onima u razvijenim zapadnim zemljama, osim pružanja naprednih usluga. Trenutna literatura savjetuje pružanje naprednih usluga. Međutim, napredne usluge ne mogu se pružati bez osnovnih usluga u koje treba uložiti i postoje znatni rizici u pružanju naprednih usluga, a koji su u radu navedeni. Ovaj rad predstavlja osnovu za daljnje istraživanje, predstavljajući trenutno stanje i buduće smjernice istraživanja.

Ključne riječi: Servitizacija, longitudinalno istraživanje, prihodi od usluga, EMS Hrvatska, Proizvodnja