

MANUFACTURING FIRMS' COOPERATION PATTERNS – A CASE FROM SLOVENIA AND SPAIN

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Abstract:

The aim of this paper is to examine characteristics of cooperation among manufacturing firms from Slovenia and Spain in R&D, production and services. The paper presents results from the largest European research on characteristics of manufacturing firms. The research is performed in more than 10 countries with an extensive survey in manufacturing firms with at least 20 employees. In this paper the results are analysed with the use of descriptive statistics. The results of the research are divided into three main parts. First we identified both countries' cooperation patterns and we compare our findings with some other European countries. Second we bring valuable additional information on each pattern and further data on detailed parameters, such as geographical proximity, networking, formality of cooperation and financial performance. Finally, we explore the relationship between cooperation and a special area of competitiveness, namely services. The main conclusion from the research was that Slovenian firms are engaging in cooperative agreements much more often than the Spanish ones. The paper presents several explanations of this fact. There are, however, some limitations of the research, especially in the service area: when observing the number of responses related to service performance measures only relatively few valid responses were accounted. The biggest value of the paper is the fact the most researchers focus just on R&D cooperation. The authors of this paper have included also other parts of manufacturing value chain, where a special emphasis is on the services as a very popular topic in today's operations management research.

Key Words: R&D, Production, Cooperation, Manufacturing firm

1. INTRODUCTION

Modern business environment characterized by high competitiveness and frequent turbulences make firms aware on the benefits and outcomes of possible cooperative agreements. The ever growing amount of new knowledge and birth of new technologies make firms specialize in order to achieve excellence in at least one specific area. OEMs transfer their activities to their suppliers. Knowledge is distributed among industries, but there is a need for an interdisciplinary approach in new product and service development. This approach can only be achieved by linking firms with other actors. We are surrounded with new business forms, such as business networks, technological networks, industrial clusters, platforms, virtual organisations, living laboratories etc. The actors in this business forms have all identified a need to cooperate with other partners. Cooperation literature could be classified according to these actors into mainly scientific cooperation –with universities and research centres-, a field that generated a bulk of work. On the opposite and receiving less attention is operation cooperation especially with other enterprises. Existing literature in this limited area put special emphasis on the motives and benefits of cooperation [1-3]. Another

prism of the same issue is a breakdown according to different areas where firms cooperate with other actors. Firms can cooperate in the area of R&D, manufacturing, purchase, sales, distribution, education, training, ICT issues, marketing etc.

The importance of R&D cooperation is already acknowledged by both the literature and practitioners [3-5] and is generally not depending on sector and/or dimension. Over the last decades, co-operation between entities in a supply chain has become a topic of frequent discussion in the operations management domain. Different terms are used to denote this co-operative attitude, indicating varying levels of co-operative efforts [6]. Authors analyze integration between parties [7, 8], supply chain collaboration [9, 10], alliances [11], collaborative relationships [12], or partnerships [13]. The fundamental rationale behind all these terms appears to be that firms cannot successfully compete by themselves and therefore seek establishment of arrangements with other entities in the supply chain [6].

R&D partnerships among firms are part of a relatively large and diverse group of inter-firm relationships that one finds in between standard market transactions of unrelated firms and integration by means of mergers and acquisitions [14]. There are different types of R&D partnerships: e.g. contractual partnerships, such as joint R&D pacts and joint development agreements, and equity-based joint ventures. Joint ventures are certainly one of the older modes of inter-firm partnering. Joint ventures, including those with a specific R&D program, have become well-known during the past decades [15–17]. Joint ventures are organizational units created and controlled by two or more parent-firms and as such they increase the organizational interdependence of the parent firms. Recent studies have established that non-equity, contractual forms of R&D partnerships, such as joint R&D pacts and joint development agreements, have become very important modes of inter-firm collaboration as their numbers and share in the total of partnerships has far exceeded that of joint ventures [16, 18, 19]. These contractual agreements cover technology and R&D sharing between two or more firms in combination with joint research or joint development projects. Such undertakings imply the sharing of resources, usually through project-based groups of engineers and scientists from each parent-firm. The costs for capital investment, such as laboratories, office space, equipment, etc. are shared between the partners.

Production cooperation covers many different possibilities and reasons for it: production of new product prototypes (result of R&D cooperation with other firms), exchanging free machine capacities, outsourcing a part of production to partners (lack of knowledge, equipment, overloaded capacities), joint production and assembly with suppliers or even customers (OEMs) etc.

Sales cooperation means joint market approach, joint distribution channels, complementary products etc. Cooperation in the field of services covers a variety of possibilities: production services, distribution, education and training etc.

In this paper we are focusing on several parts of the supply chain and examine cooperation issues among firms in the following areas: R&D, production and service/sales cooperation. We believe that literature is much more focused on the R&D cooperation with R&D institutions and it is not so rich in studying cooperation issues within operations – production, sales, services, etc. Therefore, there is a missing link in operations management literature in examining cooperation between manufacturing firms in terms of production/sales/service cooperation when we analyse cooperative agreement in terms of geographical issues, number of partners and formality of cooperation.

2. METHODOLOGY

The European Manufacturing Survey (EMS) was conducted in 2003/2004 as a pilot survey in nine European countries. The survey covers Austria, Croatia, France, Germany, Great Britain, Italy, Slovenia, Switzerland and Turkey. In the year 2007 a new survey was conducted in even more European countries, where Greece, Netherlands and Spain joined the project. In total around 4000 firms answered questions concerning manufacturing strategies, the application of innovative organisational and technological concepts in production, cooperation issues, production off-shoring, servitisation, and questions of

personnel deployment and qualification. In addition, data on performance indicators such as productivity, flexibility, quality and returns was collected. The responding firms present a cross-section of the main manufacturing industries. Included are producers of rubber and plastics, metal works, mechanical engineering, electrical engineering, textile and others.

The present paper deals with data from Slovenia and Spain. In the 2007 edition 75 firms in Slovenia responded to the questionnaire (response rate around 15%) and 150 from Spain (response rate 3,5%), all together 225. The survey was performed on manufacturing firms (NACE codes from 15 to 37) having at least 20 employees.

This paper focuses on two wider points of analysis. A first analysis deals with different areas of cooperation within each country. We will present results on how firms cooperate in the following areas:

- R&D with other firms,
- production (manufacturing) area,
- service area / sales area / distribution area.

The second analysis has a threefold purpose. First we are going to take a look at how firms in all countries cooperate based on the geographical distances between them and other actors. We have divided geographical distances into three areas:

- less than 50 km – regional cooperation,
- more than 50 km – national cooperation and
- cooperation with firms outside national borders – international cooperation.

Another interesting research topic was willingness of firms to engage in cooperative agreement with more than one partner. Our aim is to find out how bilateral agreements are slowly changing into network cooperative agreements with more than one partner. Besides national differences we were interested in cooperative patterns in all previously mentioned areas within both countries.

Social capital, trust, tacit and explicit knowledge spill-overs play a huge role when firms decide to cooperate with other actors. To protect their knowledge and competitive position they engage in cooperative agreements with various levels of formality. Again, we analyzed national characteristics regarding formality of cooperation among firms and other actors and we have also explored the dependence between formality of the network and specific cooperation area.

3. RESULTS AND DISCUSSION

Our first question for manufacturing firms was if they are keen to cooperate with other firms in the field of R&D with other firms, production and sales/service activities.

Figure 1 presents the percentual distribution of manufacturing firms in Slovenia and Spain that cooperate with other firms in all three areas. As we can see Slovenian manufacturing firms are practically twice as willing to cooperate within production and sales/service area as Spanish manufacturing firms. The Slovenian companies tend to cooperate more also in R&D with other firms, but the difference is not that big. In order to better explain cooperation patterns of manufacturing firms we included four more European countries: Germany, Austria, Switzerland and Croatia (Figure 2).

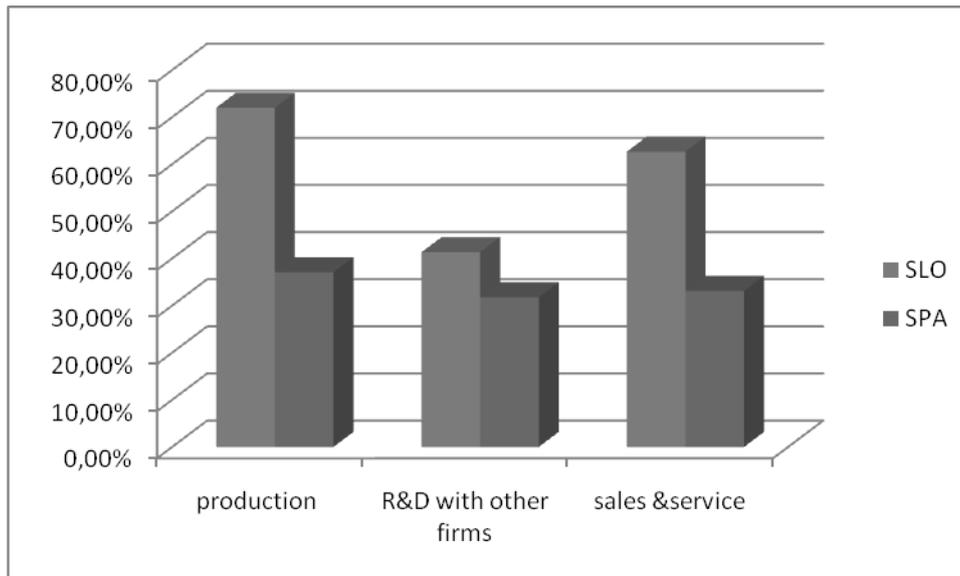


Figure 1: Cooperation of manufacturing firms in Slovenia and Spain.

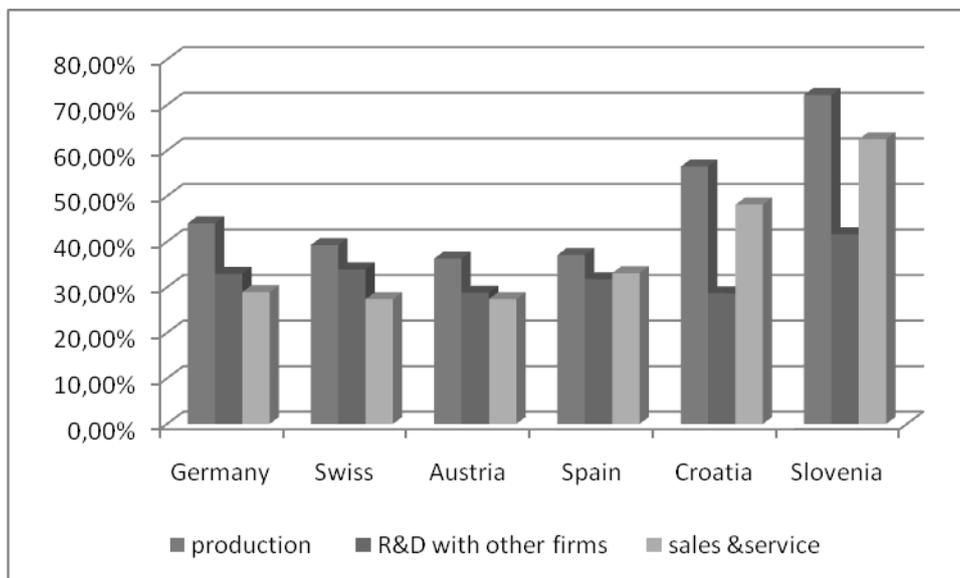


Figure 2: International cooperation of manufacturing firms.

There are substantial differences in production cooperation among countries. In Western countries approximately one third of firms cooperate with other firms in production activities, while the percentage in Croatia and Slovenia is quite higher. This can be due to the fact that a lot of firms in these two countries are suppliers and they cooperate with domestic and mostly foreign OEMs. Similar story as with production cooperation can be seen in service-sales-distribution cooperation.

Approximately one third of firms admitted cooperation in R&D area with other firms. The only exception is Slovenia with a bit higher rate. This can be a consequence of the fact that majority of surveyed firms were a part of some kind formal network organisations that were promoted in Slovenia at the beginning of this century (e.g. industrial cluster, technological platforms). We could conclude that this formal network business forms lead to a higher cooperative behaviour in R&D projects (Figure 3).

The overall impression is that firms in Western countries are less keen to cooperate than in Croatia and Slovenia.

3.1. Cooperation and geographical issues

To explain the cooperation findings in Slovenia and Spain more in detail we also analyze other three cooperation issues: geographical issues, number of partners in cooperative agreements and the formality of cooperation. We have to point out that in all following analysis we have included only firms that have stated that they cooperate in specific areas.

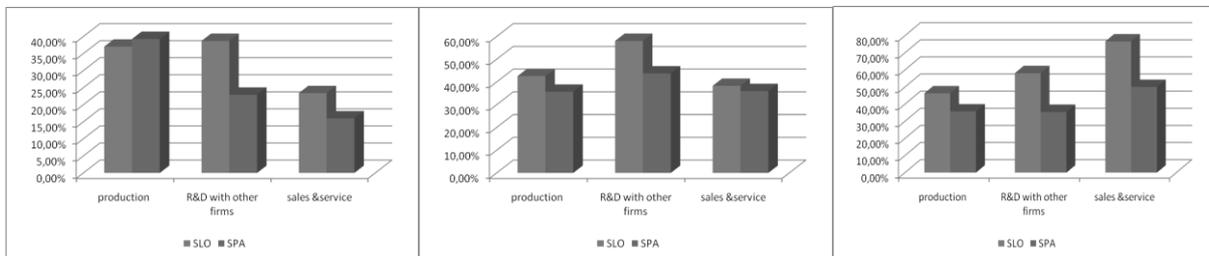


Figure 3: Cooperation of manufacturing firms in Slovenia and Spain – geographical issues (regional, national international cooperation).

Figure 3 presents the findings for regional (left), national (middle) and international (right) cooperation in the analysed areas. The results show that Spanish manufacturing firms prefer national partners (within Spain, but more than 50 km away) and international partners (outside Spain) equally. The level of regional cooperation (less than 50 km away) is a bit lower, but not always – production cooperation. Slovenian manufacturing firms tend to cooperate mostly with partners outside Slovenia. It is interesting to notice that the level of international cooperation is quite higher than for Spanish firms. Regional and national cooperation of Slovenian firms is sensitively lower than international and similar to Spanish pattern. It is also interesting to notice the effect that has proximity on cooperation area. Production cooperation has higher levels within regional cooperation than R&D with other firms and sales/service cooperation. It is completely different for international cooperation, where sales/service cooperation has the highest level, followed by R&D with other firms, while production cooperation is taking third place. National cooperation is equally dispersed within all three areas.

3.2. Cooperation, networking and formality

Next, we have questioned manufacturing firms about two more cooperation characteristics, namely whether do they engage into bilateral or multilateral cooperative agreements and what is the formality level of their cooperation. Our assumption was that firms tend to cooperate within all activities with more than just one partner. The results are slowly confirming our assumption. Spain has quite lower level than Slovenia, as on average only one out of five firms cooperates with more than one partner (Figure 4). It is particularly interesting to notice that Spanish firms hardly cooperate with more partners in the sales/services and R&D with other firms.

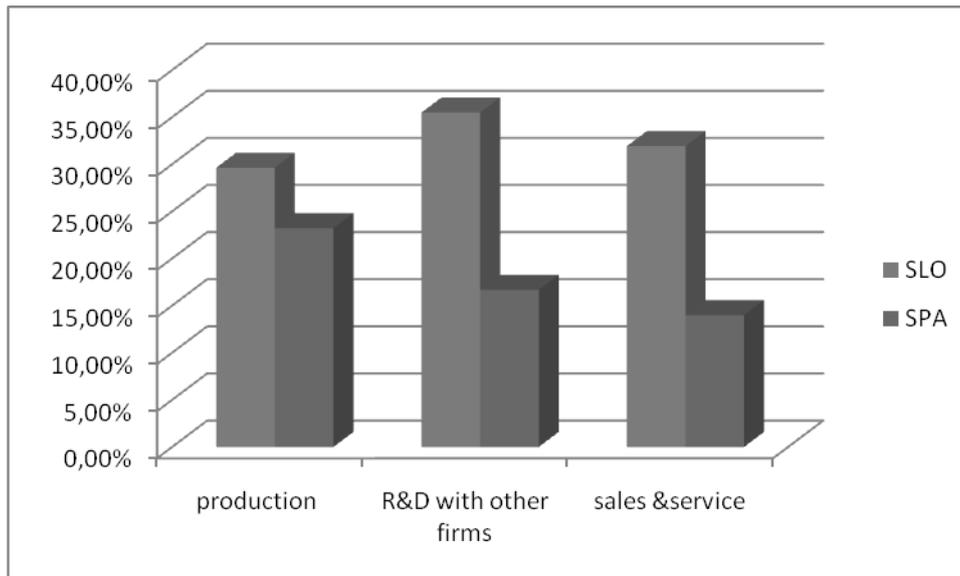


Figure 4: Cooperation of manufacturing firms in Slovenia and Spain – networking.

The formality of cooperative agreements varies from strictly contractual agreements to informal oral agreements. We were interested into strictly formal contractual agreements before actual cooperation begins. It was interesting to notice that there was not a big difference among both countries. Around 50 % of manufacturing firms make formal agreements in all three cooperation areas (Figure 5).

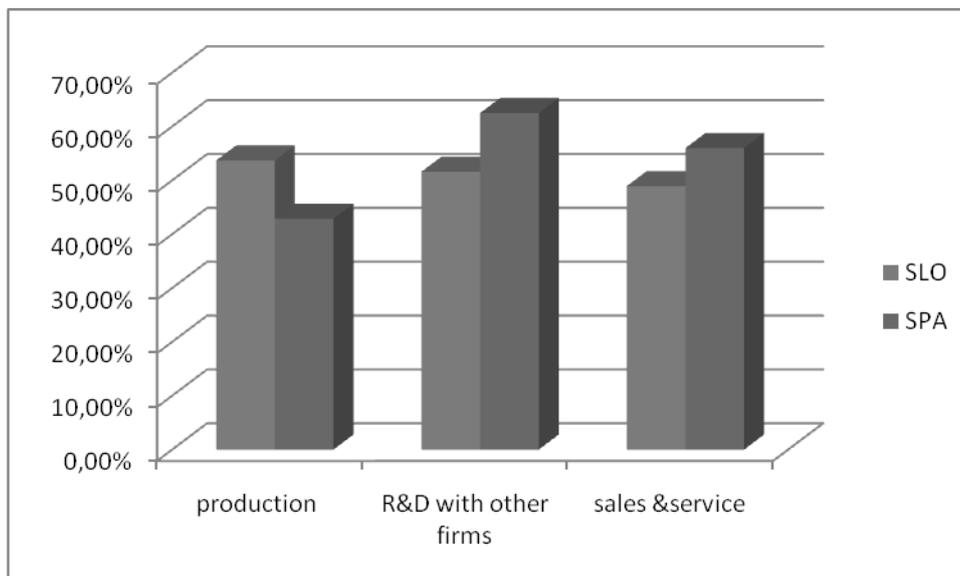


Figure 5: Cooperation of manufacturing firms in Slovenia and Spain – formality.

3.3. Cooperation and service performance

The third pillar of our analysis refers to cooperation and product-related services, more specifically linking cooperation and service performance. In nowadays complex economic situation differentiation through value added services could be an interesting strategy for manufacturing firms. An important facet is to evaluate the impact of product-related services on two financial performance measures: the share of total turnover that services contributed and were directly invoiced to customers (objective measure), complemented with an

estimation of the ratio of return on sales of services compared to the return on sales of product (subjective measure).

Table 1: Cooperation of manufacturing firms in Spain and service performance.

		Spain				share of total turnover that services contributed and were directly invoiced to customers
		ratio of return on sales of services compared to the return on sales of product				
Cooperation within:		less than on products	equal as on products	up to 1,5 times more than on products	more than 1,5 times of the return on sales on products	
Production	<i>n</i>	15	9	2	6	30
	%	46,9%	28,1%	6,3%	18,8%	6,68
Purchase	<i>n</i>	12	7	1	4	6
	%	50,0%	29,2%	4,2%	16,7%	2,5
Sales & services	<i>n</i>	19	8	2	5	2
	%	55,9%	23,5%	5,9%	14,7%	5,5

Regarding cooperation and service performance it is interesting to observe different patterns for the analyzed countries. Indifferently of the cooperation typology Spanish firms coincide in approximately half of the cases that the return on sales due to services is less than the return on sales due to product. Slight differences can be observed in the case of Slovenian firms, namely that approximately four out of ten firms consider that the return on sales due to services is up to 1.5 times more than the return on sales due to products. The double of firms in Slovenia believe and declare an up to or more than 1.5 difference in the share of services contributed to the return of sales. This result shows that possibly Slovenian firms seem to obtain a better financial result/impact of the offered services than their Spanish correspondents. In terms of share of total turnover that services contributed and were directly invoiced to customers similarities can be detected in production cooperation and sales and service areas. Contrarily, in the area of purchase cooperation Slovenian firms have three times more share of total turnover that services contributed and were directly invoiced to customers.

Table 2: Cooperation of manufacturing firms in Slovenia and service performance.

		Slovenia				share of total turnover that services contributed and were directly invoiced to customers
		ratio of return on sales of services compared to the return on sales of product				
Cooperation within:		less than on products	equal as on products	up to 1,5 times more than on products	more than 1,5 times of the return on sales on products	
Production	<i>n</i>	13	9	17	7	39
	%	28,3%	19,6%	37,0%	15,2%	6,37
Purchase	<i>n</i>	11	8	13	4	25
	%	30,6%	22,2%	36,1%	11,1%	7,486
Sales & services	<i>n</i>	16	5	16	3	31
	%	40,0%	12,5%	40,0%	7,5%	6,42

4. CONCLUSIONS

To conclude our research we have analysed production cooperation of manufacturing firms based on OECD classification for high-, medium- and low-tech sectors. We have focused on medium-tech sector (including NACE 23, 25-28) and high-tech sector (including NACE 29-34). In both sectors Slovenian manufacturing firms tend to cooperate more. We have also group manufacturing firms into small, medium size and large firms based on number of employees. The results showed that small Spanish firms like to cooperate more than Slovenian ones. It is quite opposite with large firms where Slovenian firms cooperate twice as much as the Spanish ones.

The results showed that Slovenian manufacturing firms have higher rate in all cooperation areas than Spanish firms. There are few explanations for the fact why Slovenian firms engage into more cooperative agreements. Slovenia went through a radical change of economic system in the last twenty years. The economy had to open toward new markets outside former Yugoslavia. Firms are looking for new knowledge, new partners, new capacities and are aware of their disadvantages that can be only removed by intensive cooperation with domestic and foreign actors. Another explanation is that in the past decade Slovenian government fostered different cooperation programmes (e.g. industrial cluster, technological platforms) that were a prevalent element of Slovenian competitiveness policy. A substantial number of firms in Slovenia are of were a part of some kind formal network organisations.

The situation in Spain is a slightly different. On average approximately one third of Spanish manufacturing firms cooperates in all six areas. When comparing Spain not just to Slovenia, but also to Germany, Austria, Switzerland and Croatia, it was seen that Spain is the country where manufacturing firms do not cooperate extremely often (only Austria had a slightly lower percentage). But when Spanish manufacturing firms do engage in cooperation, they prefer bilateral cooperative agreements and are reluctant to cooperate with more than one partner. And what is even more interesting, even within this bilateral agreements their cooperation is mostly very formal (especially in R&D area and sales). Spain was also the only country where regional cooperation in some cooperation areas prevails above national and international cooperation. All these results invite to formulate one main consideration, namely the lack of trust in cooperation in general. In balance to that, it is also worth

mentioning that policy-makers have initiated a series of interventions in terms of designing and creating collaborative initiatives. Their impact is still to be measured in future studies.

Regarding performance, one main methodological issue arises: observing the number of responses related to service performance measures only relatively few valid responses can be accounted, fact that might be explained by firms' lack of knowledge in quantifying rather immaterial phenomena's as services.

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