



Paper to be presented at the
35th DRUID Celebration Conference 2013, Barcelona, Spain, June 17-19

COOPERATION STRATEGY IN BUYER-SUPPLIER RELATIONSHIPS AND ITS EFFECT ON BUYER PERFORMANCE

MARTA FOSSAS-OLALLA
UNIVERSIDAD COMPLUTENSE DE MADRID
ORGANIZACION DE EMPRESAS
mfossas@ccee.ucm.es

BEATRIZ MINGUELA-RATA
UNIVERSIDAD COMPLUTENSE DE MADRID
ORGANIZACION DE EMPRESAS
minguela@ccee.ucm.es

LORENZO ESCOT-MANGAS
UNIVERSIDAD COMPLUTENSE DE MADRID
ORGANIZACION DE EMPRESAS
escot@ccee.ucm.es

Francesco D. Sandulli
Complutense University, Madrid, Spain
Department of Business Administration
sandulli@ccee.ucm.es

Abstract

This paper explores the relationship between manufacturing firms and their suppliers, and its impact on financial performance. The empirical analysis borrows from the economic theories the different buyer-supplier models i.e. the competitive model and the cooperative one. The buyer-supplier model adopted by the Spanish manufacturing firms is analyzed creating an indicator of cooperation with suppliers that allows us to classify the sample. We find that firms that cooperate over the average achieve better financial performance, however, this relationship is not linear so we conclude that firms with intermediate levels of cooperation achieve higher performance than those firms that do not cooperate or cooperate in a maximum degree.

Jelcodes:M11,M

COOPERATION STRATEGY IN BUYER-SUPPLIER RELATIONSHIPS AND ITS EFFECT ON BUYER PERFORMANCE

ABSTRACT

This paper explores the relationship between manufacturing firms and their suppliers, and its impact on financial performance. The empirical analysis borrows from the economic theories the different buyer-supplier models i.e. the competitive model and the cooperative one. The buyer-supplier model adopted by the Spanish manufacturing firms is analyzed creating an indicator of cooperation with suppliers that allows us to classify the sample. We find that firms that cooperate over the average achieve better financial performance, however, this relationship is not linear so we conclude that firms with intermediate levels of cooperation achieve higher performance than those firms that do not cooperate or cooperate in a maximum degree.

Key words: Suppliers, cooperation, financial performance, supply chain.

1. Introduction

The manufacturing industry is currently characterized by a continuous process of vertical specialization, which involves firms carrying out a very specific set of tasks and outsourcing a wide range of services. This means that purchases from suppliers have become one of the largest expense items for most firms, accounting for around 60-70% of the cost of sales for many manufacturing firms (Ellram, 1992a). This outsourcing phenomenon means that variables relating to the quality and price of the products offered by a firm are not exclusively related to its capabilities, but to a significant extent also depend on the network of suppliers with whom it interacts (Modi and Mabert, 2007).

Therefore, the buyer-supplier relationship plays a fundamental role in competitive positioning, largely when the environment is characterized by uncertainty and dynamism (Youssef, 1992; Handfield and Nichols, 1999; Ou et al., 2010). Firms must be ready to develop high quality products that satisfy the needs of customers, quickly and at a lower cost than the competing firms (Minguela-Rata et al. 2011, Martínez-Senra et al. 2012). This relationship between the firms that form part of the supply chain can take on different degrees of complexity. From one of low complexity when it involves the purchase of standardized goods, to one of great complexity when acquiring specialized products available from few suppliers or requiring an investment in specific assets to manufacture them (Ellram, 1992b).

This has led firms to enter into agreements that can be of competitive type, based on price, or cooperative type, based on working together and exchanging information (Hoyt and Huq, 2000; Mihi-Ramírez et al., 2012). This cooperative relationship with suppliers can increase a firm's ability to compete through helping to reduce production and operating costs and improving quality and productivity (Choy et al., 2002; Cambra and Polo, 2008).

All of them will have an impact on the firm's financial performance (Carr and Pearson, 1999; Carr and Kaynak, 2007).

As a result, the aim of this study is to analyze the relationships established by Spanish manufacturing companies with their suppliers, and assess the impact of these relationships on performance. To achieve this goal we are going to examine buyer-supplier relationships using the explanatory theories, identify the extreme models of this relationship and analyze the variables that can be affected in terms of firm performance. All of this allows us to establish the hypotheses for this paper. We then present the information source used to test our hypotheses. After which we describe the procedure followed to classify firms in our sample, in terms of creating a supplier cooperation indicator. Lastly, we present the results of our work and set out the conclusions that can be drawn from them.

2. Theoretical foundation

Over the last few years, the relationship established with suppliers has acquired great importance as a result of its impact on company performance. This importance has led to studies that try to explain the type of buyer-supplier relationship from a theoretical point of view. However, there is no single theory that on its own can explain the complexity of this type of relationship. Instead, each theory deals with a specific aspect of the supplier relationship, therefore, no theory appears to be superior to the others.

As a result, we are first going to discuss the supplier relationship as explained by Transaction Cost theory, Resource-Based Theory and Agency Theory. We will then present the two extreme models of the buyer-supplier relationship. Lastly, from a theoretical point of view, we will analyze the connection between the buyer-supplier relationship and firm performance.

2.1. Theories explaining the buyer-supplier relationship

First, Transaction Cost Theory compares the different mechanisms that can be used when structuring exchange relationships, specifying the conditions under which one mechanism or another is the most appropriate. Given this, Williamson (1985) argued that any problem can be investigated using this theory as long as it can be directly or indirectly formulated as a contract. We can therefore state that inter-company vertical relationships, an example of which is the buyer-supplier relationship, can be studied using Transaction Cost Theory.

When the firm purchases components rather than produce them, one or both of the parties may act in its own interests to improve its short-term position at the expense of the other. When the supply market is competitive and assets are not very specific, the customer can easily end the relationship with the supplier if it does not fulfill its obligations or if its resources are no longer required (John, 1984). In this situation we find, according to the terminology established by Heide (1994), *unilateral mechanisms*, which clearly separate the parties on the basis that one of them is in a position of power.

In contrast, firms can try to reduce opportunistic behavior by recognizing the advantages of working together for mutual benefit and using *bilateral mechanisms* (Williamson, 1985). These mechanisms strengthen the relationship between the parties involved and, as a result, protect the investments made in specific assets. This type of mechanism can be used depending on the specific nature of the assets, the degree of

uncertainty and the willingness of the parties to take on risk (Walker and Poppo, 1991). While these mechanisms involve investment costs not present in other types of relationship, one must bear in mind that these costs mainly arise at the beginning of the relationship, due to adjustments that must be made, or communication that has to be encouraged. As the relationship implies a high degree of specificity and large exchange volumes (recurring transaction) and strengthens the relationship between the parties, the increase in investment costs will be offset by a reduction in other costs (González-Benito et al., 2000).

Second, Resource-Based Theory analyses long-term relationships with a group of key suppliers on the basis of a win-win philosophy, which can result in a longer lasting competitive advantage than provided by a system of competitive bidding (Harrison and St John, 1996). According to Hoyt and Huq (2000), trust, the desire to work together and the efficient flow of information allow for the creation of a sustainable competitive advantage.

Finally, Agency Theory examines the buyer-supplier relationship using the principal-agent model in which the two parties are inter-dependent and may pursue different goals (Zsidisin and Ellram, 2003). According to this theory, the variables that influence the buyer-supplier relationship model are information systems, uncertainty of results, conflicting goals, duration of the relationship, adverse selection and moral hazard. Different buyer-supplier relationship models will exist depending on how these characteristics are combined.

In summary, we have different theories that propose very different forms of relationship, from a situation where the parties are independent and pursue their own goals to one where there is a high degree of interdependence and common goals.

2.2. Extreme models of the buyer-supplier relationship

The review of the literature about buyer-supplier relationship allows us to identify different models on the basis of the level of communication, the selection criteria, the functions involved, the degree of dependence, the duration of the relationship, etc. While there are many potential buyer-supplier models, there are two situations that are very different from each other.

On the one hand we have a model, which is short-term and involves the minimum exchange of information, where selection is on the basis of cost and requires little involvement by either party. Different terms are used to refer to this model, such as free market negotiation (Landeros and Monczka, 1989), output model (Helper, 1991), traditional focus (Burdett, 1992), competitive model (Hendrick and Ellram, 1993), spot market (Toni and Nassimbeni, 1999) and combative relationship (Billington et al., 2006), although there is consensus on the key aspects such as the time horizon, information exchange, suppliers selection, level of commitment, etc. From this point onwards we will refer to this type of buyer-supplier relationship as the *competitive model*.

The competitive model involves a relationship between a customer firm and a large number of suppliers based on short-term contracts that specify the conditions for each transaction (price, quality, delivery and profit sharing). Suppliers are chosen on the basis of the price they offer during a competitive bidding. In addition, both firms try to be as independent as possible, and as a result the exchange of information is minimal. It is limited to the specifications of the product being transferred and involves the minimum possible number of hierarchical levels and departments within the firms.

On the other hand we have a long-term model characterized by the continuum exchange of information, the careful selection of suppliers taking into account both operational and strategic aspects, and a high degree of involvement by both parties. Although in the literature there are many terms used to refer to this model, such as buyer-supplier association (Shapiro, 1985), cooperative relationship (Landeros and Monczka, 1989), strategic association with suppliers (Ellram, 1990), voice model (Helper, 1991), contractual relationship (Toni and Nassimbeni, 1999), and super-collaboration (Billington et al., 2006), there is general consensus about its definition. From this point onwards we will refer to this type of buyer-supplier relationship as the *cooperative model*.

This supplier association is a close long-term relationship between a firm and a small number of suppliers, based on trust, mutual dependence and the continuum exchange of information. Thus both parties work together, even in the initial stages of the design of components and products, and share resources, personnel, facilities, etc. Developing this relationship requires mutual attraction whose elements are expected value, trust and dependence (Hald et al., 2009).

As a result, this relationship is not limited to the mere purchase of the necessary material from the suppliers, but it implies a high degree of involvement by both parties. We can see that it has features that are opposite to those of the competitive model such as the number of suppliers, the selection criteria, the time horizon, the exchange of information, the dependence level and the degree of involvement (Fossas-Olalla et al., 2010).

2.3. Impact of the buyer-supplier relationship on performance

In this section we are going to look at two aspects of the buyer-supplier relationship. First, we present the different methodologies found in the literature for measuring the results of the buyer-supplier relationship. Second, we review some papers that have examined the link between the type of buyer-supplier relationship and company performance.

There are many different views on how the performance of the buyer-supplier relationship can be measured. Buyer-supplier relationship can be evaluated through (1) the specific behavior of the supplier (Hendrick and Ellram, 1993; Mummalaneni et al., 1996; Prahinski and Benton, 2004; Modi and Mabert, 2007); (2) the effect on cost-related operating variables (Hendrick and Ellram, 1993; Richeson et al., 1995; Kaynak, 1997; Toni and Nassimbeni, 1999), quality (Stuart, 1993; Richeson et al., 1995; Kaynak, 1997; Toni and Nassimbeni, 1999; Kannan and Tan, 2002; Carr and Kaynak, 2007) or time (Hendrick and Ellram, 1993; Kaynak, 1997; Krause et al., 2000). In addition, it is possible to determine the effect of the buyer-supplier relationship on (3) financial performance measured using return on investment, market share, profits, turnover, etc. (Stuart, 1993; Germain and Dröge, 1997; Kaynak, 1997; Tan et al., 1998; Carr and Pearson, 1999; Wisner, 2003; Carr and Kaynak, 2007); (4) the degree of each party's satisfaction with the relationship (Brulhart, 2007; Elif and Wasti, 2009), (5) environmental behavior (Plambeck et al. 2012) or (6) supplier innovativeness (Inemek and Matthyssens, 2012).

In terms of the effect of the buyer-supplier relationship on performance, we can mention several studies. An empirical study carried out by Hendrick and Ellram (1993) on supplier relationships shows that the customer firms involved in an association with suppliers achieve, from the very beginning of the relationship, operating improvements in areas such as defects, delivery, cycle time and compliance rate. In addition, these firms

obtain lower prices, which improve their profits. They also obtain value added services, reductions in total quality cost, reductions in ownership costs, a reduction in the variability of components and improvements in the quality of the product. In short, according to these authors, the benefits generated from the association with suppliers suggest further added value. As a result, they consider that associations with suppliers generate better results than the alternative of going to the market and dealing with suppliers following the traditional approach.

Germain and Dröge (1997) incorporate the analysis of financial performance into a study of manufacturing companies. As the degree of association with suppliers increases, business efficiency grows due to a reduction in the number of weeks stock has to be held and an improvement in both financial performance (return on investment, return on sales and profits) and market performance (growth in sales) compared to those of the main competitors. Carr and Pearson (1999) also find that cooperation with key suppliers leads to improvements in the financial performance measured through return on investment, profits as a percentage of sales, net income before taxes and the present value of the firm.

Groves and Valsamakis (1998) compare the results achieved through cooperative and non-cooperative relationships. They find that association offers better results for most of the measures analyzed, both financial and non-financial performance.

The research carried out by Carr and Kaynak (2007) on manufacturing companies concludes that relationships with suppliers characterized by the continuum exchange of information and supplier development initiatives lead to improvements in product quality. These improvements can lead to increased sales and can also generate higher customer loyalty and reduce defects, all leading to better financial performance for the firm.

Therefore, this literature review shows us that firms involved in cooperative relationships with their suppliers achieve higher performance. This leads us to ask ourselves if the result would be the same for Spanish manufacturing companies, or in other words, whether greater cooperation by these firms with their suppliers will indeed lead to better financial performance.

However, this research does not just involve transferring a methodology used in other countries to Spain, which would limit our contribution to mere replication. In the literature discussed earlier, the authors had a starting point consisting of the classification of the manufacturing firms in terms of the degree of supplier cooperation. However, we have no such classification for Spanish firms, and so in this paper we have had to start by defining an instrument that allows Spanish manufacturing companies to be classified according to their buyer-supplier relationship, so that we can subsequently analyze the relationship between these models and performance.

3. Research methodology

3.1. Data source

We have chosen the ESEE (*Encuesta Sobre Estrategias Empresariales: Business Strategy Survey*) as our source of information on Spanish industrial companies. ESEE has been carried out each year since 1990 by the Spanish Ministry of Science and Technology and the Public Enterprise Foundation (*Fundación Empresa Pública - FUNEP*) and is sent to a panel of firms representing the Spanish manufacturing industry. Its design is quite

flexible and its purpose is to generate microeconomic panel data suitable for establishing and testing econometric models derived from economic theory.

The reference population for the ESEE is companies with 10 or more employees in what is normally known as the manufacturing industry. The geographical scope is the entire national territory, or in other words, those firms that have at least one production facility in Spain. The figures are annual. The data was cleaned following the guidelines provided by FUNEP. Our sample consists of 1,980 firms and its distribution by sector in the Spanish manufacturing industry is shown in Table 1.

Table 1.
Distribution by sector.

Sector	N	%
Processing and preserving of meat and production of meat products	54	2.7%
Manufacture of food products and tobacco products	182	9.2%
Manufacture of beverages	44	2.2%
Manufacture of textiles	146	7.4%
Manufacture of leather and related products	54	2.7%
Manufacture of wood	76	3.8%
Manufacture of paper and paper products	64	3.2%
Printing and reproduction of recorded media	107	5.4%
Manufacture of chemicals and chemical products	127	6.4%
Manufacture of rubber and plastic products	101	5.1%
Manufacture of other non-metallic mineral products	165	8.3%
Manufacture of basic metals	61	3.1%
Manufacture of fabricated metal products	260	13.1%
Manufacture of machinery and equipment	135	6.8%
Manufacture of computer, electronic and optical products	32	1.6%
Manufacture of electrical equipment	97	4.9%
Manufacture of motor vehicles	94	4.7%
Manufacture of other transport equipment	35	1.8%
Manufacture of furniture	106	5.4%
Other manufacturing	40	2.0%
Total	1980	100%

3.2. Variables that define the buyer-supplier relationship

In this section, we present and define the variables from the ESEE that are going to allow us to identify both the type of buyer-supplier relationship and the performance. After a detailed analysis of the variables included in the ESEE¹, and considering the characteristics that allow identifying the buyer-supplier relationship, we have found that it allows us to analyze three dimensions, namely the exchange of information, supplier development and mutual dependence².

The first characteristic, the *exchange of information* between the firm and its suppliers refers to the information shared by both parties, which is as detailed as possible, of sufficient frequency and delivered at the appropriate time to meet the needs of the firms. The ESEE collects data on the exchange of information through the analysis of the use of communication technologies with suppliers, as proposed by Ellram (1992a), Hendrick and Ellram (1993), Carr and Pearson (1999), Rinehart et al. (2004) and Carr and Kaynak (2007).

¹ The variables available can be seen at <http://www.funep.es/esee/sp/svariables/cuestionarios/c-esee06.pdf>

² Analysis available from the authors on request.

The second characteristic, *supplier development*, can be defined as the long-term effort by the buyer firm to work with its suppliers to improve their performance in terms of costs, quality, delivery and technical capability. This characteristic is reflected in the ESEE through technological cooperation with suppliers. Using as our starting point the contributions from Hendrick and Ellram (1993), Groves and Valsamakis (1998), Wagner (2006), Carr and Kaynak (2007) and Nieto and Santamaría (2010) in relation to supplier development within the buyer-supplier relationship, we can state that if a firm collaborates technologically with its suppliers it is involved in supplier development activities.

Finally, *mutual dependence* refers to the importance of the component to the customer firm and the impact the loss of the supplier would have on the customer's business. The ESEE allows us to study mutual dependence through the acquisition of customized components from third parties without providing the firm the materials (*mutual dependence 1*). We have selected the scenario, in which the firm does not provide the materials, to avoid including suppliers involved in subcontracting, which is simply the assembly of components. Suppliers involved in customized manufacturing for the customer will need to adapt their procedures, routines, guidelines and technological standards to those of the buyer firm. This indicates that there is a degree of inter-dependence between the supplier and the buyer, as can be seen from the research of Heide and John (1990), Hendrick and Ellram (1993), Leverick and Cooper (1998) and Rinehart et al. (2004). The supplier will have made specific investments that would be difficult to recover if the buyer were lost; if the buyer lost its supplier it would have to invest both time and effort in working with another supplier so that it could manufacture the customized products. When in the ESEE firms responded in the affirmative to making customized purchases, they also gave the value in Euros of the purchases of finished products or customized components for their firm from third parties. To convert this data into a relative variable, we have calculated the percentage of this type of customized purchasing compared to the total value of the purchases by each firm (*mutual dependence 2*). If customized purchases are a large proportion of total purchases this indicates a high degree of dependence between the firm and its suppliers. In Table 2 we show the distribution of the firms on the basis of these variables.

Table 2
Variables.

Variable		N	%
Exchange of information	No	1471	73.9%
	Yes	519	26.1%
Supplier development	No	1578	79.3%
	Yes	412	20.7%
Mutual dependence 1	No	1471	73.9%
	Yes	509	25.6%
Mutual dependence 2	0%	1471	73.9%
	1% - 25%	373	18.7%
	26% - 50%	88	4.4%
	51% - 75%	30	1.5%
	76% - 100%	18	0.9%

In terms of the performance, we have chosen EBITDA as an indicator of the financial performance of the buyer firm. EBITDA is considered by many authors as one of the financial variables related to the buyer-supplier model (Richeson et al., 1995; Germain and Dröge, 1997; Kaynak, 1997; Carr and Pearson, 1999; Carr and Pearson, 2002; Carr and

Kaynak, 2007 and González-Benito, 2007). So we can now classify our sample of firms according to the type of relationship they have with their suppliers.

3.3. The cooperation indicator

The first stage in our research involves classifying the firms on the basis of the model they adopt for their relationship with suppliers. From the data available to us, we are going to create a cooperation indicator through a factor analysis that includes the variables that define the type of relationship, or in other words, exchange of information, supplier development and mutual dependence. The advantage of using factor analysis of principal components to construct a synthetic indicator is that we do not need to establish a priori the weight of each variable in the indicator. On the contrary, this technique tries to avoid possible subjectivity by estimating the final weights so that the greatest possible percentage of variability in the sample is explained, therefore allowing for the creation of a synthetic supplier cooperation indicator that reflects the maximum information possible from the variables that initially define the type of buyer-supplier relationship.

As mentioned previously, exchange of information and supplier development are measured with a single variable. However, mutual dependence is measured with two variables. In order to construct the indicator from the three variables that define the type of relationship, we first need to create a dependence indicator³. The intention is to create an indicator, which includes the information provided by the two mutual dependence variables.

To create the dependence indicator we apply a factor analysis of principal components including the variables *mutual dependence 1* and *mutual dependence 2* (Table 3). To justify the use of factor analysis we carry out Bartlett's test and the Kaiser-Meyer-Olken (KMO) test on the null hypothesis of no correlation. The results obtained through both tests show that the null hypothesis is rejected. To select the number of factors we follow the Kaiser-Guttman K1 rule, which establishes that one must extract all the dimensions with an Eigenvalue greater than one. The Eigenvalues tell us that only that corresponding to the first component is greater than one, so this will summarize the rest representing them in a consistent manner.

Table 3
Dependence indicator (factor analysis).

Component	Eigenvalue		
	Total	% of variance	% accumulated
1	1.627	81.33%	81.33%
2	0.373	18.67%	100%
KMO test: 0,510		Bartlett's test: 0.000	
Variable	Communality		Factor loading
	Initial	Extraction	
Mutual dependence 1	1.000	0.813	0.902
Mutual dependence 2	1.000	0.813	0.902

It is worth noting that the two variables included in this factor show communality, with 81.33% of the variance explained by the common factors, which allows it to be viewed as acceptable. In addition, the final factor loads are close to +1, so the variables show a strong positive relationship with the factor considered.

³ This methodology to obtain a synthetic indicator in two stages, a first stage in which the analysis of principal components is used to obtain an indicator for each initial group or dimension and a second stage in which the analysis of principal components is again used to obtain an overall synthetic measure, has been widely used in empirical studies (see Domínguez Serrano et al. 2011)

Taking into account that this mutual dependence indicator is a normalized factor with a mean value of zero, we can split the sample into firms that show a below average degree of dependence and those that show an above average degree of dependence (Table 4).

Table 4
Degree of mutual dependence.

Degree of dependence	N	%
Below average	1471	73.9%
Above average	509	25.6%
Total	1980	100%

After this initial step, we can create a cooperation indicator from the exchange of information, supplier development and the dependence indicator. We use these three variables in a factor analysis of principal components, which will allow us to construct a cooperation indicator in which the weights of each variable will be determined by this analysis. As for the dependence indicator, we again select the number of factors following the Kaiser-Guttman K1 rule, which establishes that all the dimensions with an Eigenvalue greater than one must be extracted. In the analysis of principal components only one Eigenvalue greater than one is obtained, which explains 42.75% of the total variation of the matrix of correlations (Table 5). We are aware of this limitation, but it should be remembered that our intention in using factor analysis has been to create an indicator whose weights are fixed directly by that analysis, not in advance by us.

Table 5
Cooperation indicator (Factor Analysis)

Component	Eigenvalue		
	Total	% of variance	% accumulated
1	1.283	42.752%	42.752%
2	0.893	29.774%	72.526%
3	0.824	27.474%	100%
KMO test: 0.559		Bartlett's test: 0.000	
Variable	Communality		Factor loading
	Initial	Extraction	
Dependence indicator	1.000	0.356	0.596
Exchange of information	1.000	0.448	0.670
Supplier development	1.000	0.478	0.692

In order to check the robustness of these results from extracting factors by principal components, we have carried out a Boolean Factor Analysis or Latent Class Factor Analysis only with dichotomous variables⁴. The classification of firms with this alternative analysis is identical to that initially obtained, and we therefore consider that the classification of the firms derived from the factor analysis of principal components is suitable.

⁴ In the first option with the variables mutual dependence 1, supplier development and exchange of information; and, in the second option, with the variables dependence indicator, supplier development and exchange of information.

4. Findings from the empirical study

4.1. Analysis of the relationship between the cooperation degree and financial performance

The synthetic cooperation indicator obtained in the previous section is a normalized continuous variable with zero mean and unit variance, which allows the sample of firms to be classified into those that cooperate above average and those that cooperate below average. As it can be seen in Table 6, of the total of 1,980 firms analyzed, around 50% have been classified into each group. It should be noted that we are not stating that 50% of the firms cooperate and the other 50% do not, but instead by using a relative measure of cooperation (with respect to the average) we can classify the sample of firms into those that cooperate more and those that cooperate less, in relative terms.

Table 6
Cooperation degree with suppliers.

Cooperation degree	N	%
Below average	974	49.2%
Above average	1006	50.8%
Total	1980	100%

To look in more detail at the relationship between supplier cooperation and financial performance we are going to analyze the differences in average EBITDA between the two groups of firms testing the following hypothesis.

Hypothesis 1: "Firms with above average cooperation with suppliers achieve a higher EBITDA than those with below average cooperation".

To test this hypothesis, we are going to analyze the EBITDA in each of the groups into which we have classified our sample of firms on the basis of the degree of supplier cooperation. In Table 7 we can see that EBITDA is higher for firms that cooperate above average than for those that cooperate below average.

Table 7
EBITDA and cooperation degree (descriptive statistics).

Variable	Cooperation degree	N	Mean	Standard deviation	Std. error mean
EBITDA	Below average	974	7.3209	16.31208	0.52294
	Above average	1006	9.0301	12.24381	0.38603

We are going to test whether these average differences detected are statistically significant by applying analysis of variance (ANOVA) and the T-test (Table 8). The analysis of variance, taking EBITDA as the dependent variable and the cooperation degree as the independent variable, provides us with an F statistic with a p-value below the significance level ($0.008 < 0.01$). We can therefore confirm to a 99% significance level that there are differences in EBITDA based on the level of cooperation with suppliers. Since the Levene test does not allow us to clearly reject the hypothesis of heteroscedasticity, we have estimated the Welch test and the T-test, which are robust for samples with different variances, in both cases obtaining a p-value of less than 0.01. We therefore reject at the

99% confidence level the null hypothesis of equality of means and we conclude that there are significant differences in average EBITDA on the basis of the cooperation degree.

Table 8
EBITDA and cooperation degree (ANOVA and T-test).

	Sum of squares	Df	Mean square	F	Sig.		
Between groups	1445,038	1	1445,038	6,980	0,008		
Within groups	409293,984	1977	207,028				
Total	410739,022	1978					
Levene statistic = 3.841 Sig = 0.05							
Welch statistic = 6.915 Sig. = 0.009							
	T	Df	Sig.	Mean difference	Std. Error difference	95% confidence interval of difference	
Equal variances assumed	-2.642	1977	0.008	-1.70926	0.64697	-2.98406	-0.43445
Equal variances not assumed	-2.630	1802.335	0.009	-1.70926	0.64999	-2.98406	-0.43445

In short, we accept our hypothesis 1 and we can therefore state that firms that cooperate with their suppliers above average have a significantly higher EBITDA (9.03 on average) than those that cooperate below average (7.32 on average).

To confirm the previous results we are going to analyze the effect of buyer-supplier cooperation on EBITDA discounting the effects that other company variables could have on this. For this, we carry out a linear regression analysis in which we take into account some of the variables that could be affecting EBITDA, in addition to the degree of cooperation, to discount their possible effect. Note that with this regression analysis we are not trying to estimate a complete explanatory model for EBITDA, but we want to test the partial effect of buyer-supplier cooperation on company financial performance once other explanatory variables available in the ESEE have been discounted or controlled for. The control variables selected are those included in the ESEE that could be affecting EBITDA along with the degree of cooperation: productivity per employee (continuous variable estimated from the gross value added per employee), the age of the firm (measured in intervals from the year it was founded⁵), the size of the firm (measured in intervals for the size of the workforce⁶) and the business sector (considering a total of 20 sectors according to the National Classification of Economic Activities NACE).

In Table 9 we show the results of the linear regression analysis where we estimate the effect of the degree of supplier cooperation on EBITDA, discounting the potential impact on this of the set of control variables selected. Regression (1) only includes the control variables. The firms with higher productivity per employee are those that obtain a higher EBITDA, although the age of the firm, its size and its main activity also have a significant impact. In regression (2) we include the cooperation indicator and conclude with a 95% confidence level, once the rest of the control variables are taken into account, that

⁵ For the age of the company, five intervals have been included based on the year the company was founded: before 1940, 1940-1959, 1960-1975, 1976-1985 and after 1985.

⁶ For the size of the company, the figure used is the size of the workforce classified into six intervals: less than 20 employees, from 21 to 50, from 51 to 100, from 101 to 200, from 201 to 500 and more than 500 employees.

firms cooperating with their suppliers above average obtain a significantly higher EBITDA than firms cooperating below average. We can also use this regression analysis to confirm whether any of the variables used to construct the cooperation indicator is more important than the others when it comes to explaining EBITDA. For that, in regression (3), in addition to the cooperation indicator and the control variables, we have added the dependence indicator, supplier development and exchange of information. The results show that the overall fit of the regression worsens and that none of these three variables proves significant, so we can conclude that none of these three variables is more important than the others when it comes to explaining EBITDA and that it is the joint indicator that has the most significant effect.

Table 9
EBITDA and cooperation indicator (Linear regression model).

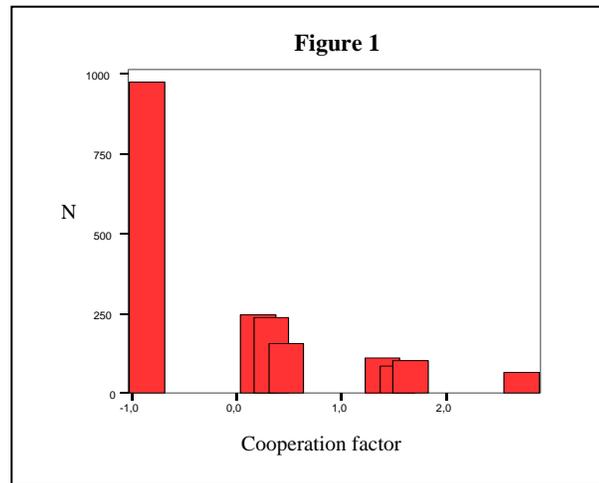
	(1)	(2)	(3)
Productivity per employee	0.152** (0.017)	0.152** (0.017)	0.152** (0.017)
Constant	-0.344 (1.722)	-0.456 (1.718)	-0.468 (1.722)
Cooperation indicator	-	1.052* (0.534)	1.671* (0.847)
Dependence indicator	-	-	-0.339 (0.626)
Supplier development	-	-	-0.833 (0.674)
Exchange of information	-	-	-0.299 (0.622)
Age, F-statistic	4.570**	4.630**	4.556**
Size, F-statistic	2.682*	3.270**	2.731*
Sector, F-statistic	2.758**	2.795**	2.746**
N	1661	1654	1654
Mean dependent var	8.710	8.718	8.718
S.D. dependent var	11.629	11.619	11.619
R-squared	0.349	0.353	0.353
Adjusted R-squared	0.337	0.341	0.340
S.E. of regression	9.4659	9.4353	9.4402
Akaike info criterion	7.3512	7.3454	7.3482
Schwarz criterion	7.4490	7.4468	7.4594
F-statistic	30.147**	29.455**	26.789**
(Standard deviation)			
** $p < 0.01$, * $p < 0.05$			
We have used Heteroscedasticity White robust standard error estimator			
F-statistic is shown for the factors Age, Size and Sector, to test the joint significance of all categories in each factor			

4.2. Analysis of the results based on the different degrees of cooperation

Once it has been demonstrated that firms that cooperate above average show better results, the next stage is to look in more detail at the relationship between supplier cooperation and financial performance by testing the hypothesis of the linearity of this relationship. In other words, we are going to analyze whether results improve as the degree of cooperation with suppliers increases.

Hypothesis 2: "The greater the degree of cooperation with suppliers, the higher the EBITDA obtained."

To test this hypothesis, instead of using the previous classification into two categories, above and below average, we are going to analyze the distribution of the cooperation indicator derived from the factor analysis of the different firms carried out in section 3.3. The factor analysis generated a continuous factor with a distribution that allows us to identify different degrees of cooperation and identify groups of firms (Figure 1).



On the one hand, we find a large group of firms with a factor value below zero, which coincides with the firms with a below average cooperation indicator. On the other hand, we have the rest of the firms, or in other words, those classified as firms that cooperate above average. This in turn can be broken down into three categories, clearly differentiated on the basis of the relative degree of supplier cooperation. First, we have firms with a factor value between zero and one. Next, we find firms with a value between one and two. Lastly, firms with a value greater than two. It should be remembered that this indicator, in addition to having an average of zero, also has a variance equal to one, so the classification of firms that cooperate above average is being completed relatively on the basis of one or two times the standard deviation of the cooperation indicator itself.

If we look in more detail at this classification, analyzing the response of the firms about mutual dependence, exchange of information and supplier development, we find that the firms with a score below zero for the factor have not implemented any of the cooperation initiatives considered in this study (*Null cooperation*). The firms that obtain a score between zero and one are those that have implemented a single cooperation initiative with suppliers from among the three considered (*Low cooperation*), or in other words, they have opted for exchange of information, supplier development or mutual dependence. The firms with a factor value of between one and two have implemented two cooperation initiatives with suppliers in different combinations (*Medium cooperation*). Lastly, the firms that have a score over two have implemented all three initiatives considered (*High cooperation*). In Table 10 we can see the distribution of firms on the basis of the degree of cooperation, along with the EBITDA for each group, and we can see that this is highest for those firms with low cooperation.

Table 10
EBITDA and cooperation initiatives (descriptive statistics).

Variable	Cooperation	N	Mean	Standard deviation	Std. error mean
EBITDA	Null cooperation	974	7.3209	16.31208	0.52294
	Low cooperation	640	9.1408	13.17005	0.52059
	Medium cooperation	300	8.9350	10.45601	0.60368
	High cooperation	66	8.3894	10.45056	1.28637

To test whether these differences in the average are statistically significant, we apply the ANOVA test (Table 11). This analysis of variance, taking EBITDA as the dependent variable and the cooperation degree as the independent variable, provides us with an F statistic with a p-value below the significance level ($0.067 < 0.10$). We can therefore confirm to a 90% significance level that there are differences in EBITDA based on the number of cooperation initiatives.

Table 11
EBITDA and cooperation degree (ANOVA).

	Sum of squares	Df	Mean square	F	Sig.
Between groups	1482.685	3	494.228	2.385	0.067
Within groups	409256.337	1975	207.218		
Total	410739.022	1978			

Test statistic = 2.344 Sig. = 0.073

An analysis of the differences in average EBITDA between the different categories shows that significant differences largely exist between the firms that do not cooperate and those with low cooperation (Table 12).

Table 12
Comparison of cooperation degree (Tamhane test).

(I) Cooperation degree	(J) Cooperation degree	Mean difference (I-J)	Std. error	Sig.	95% confidence interval	
					Lower bound	Upper bound
Null cooperation	Low cooperation	-1.81992*	0.73789	0.080	-3.7638	0.1240
	Medium cooperation	-1.61414	0.79868	0.235	-3.7208	0.4926
	High cooperation	-1.06853	1.38861	0.970	-4.8059	2.6688
Low cooperation	Null cooperation	1.81992*	0.73789	0.080	-0.1240	3.7638
	Medium cooperation	0.20578	0.79715	1.000	-1.8973	2.3089
	High cooperation	0.75139	1.38772	0.995	-2.9839	4.4867
Medium cooperation	Null cooperation	1.61414	0.79868	0.235	-0.4926	3.7208
	Low cooperation	-0.20578	0.79715	1.000	-2.3089	1.8973
	High cooperation	0.54561	1.42098	0.999	-3.2719	4.3631
High cooperation	Null cooperation	1.06853	1.38861	0.970	-2.6688	4.8059
	Low cooperation	-0.75139	1.38772	0.995	-4.4867	2.9839
	Medium cooperation	-0.54561	1.42098	0.999	-4.3631	3.2719

Dependent variable: EBITDA
*: Mean difference is significant at the 0.1 level

The ANOVA test seems to indicate that the relationship between cooperation and EBITDA is not linear, therefore rejecting hypothesis 2. In other words, although there is a significant difference between cooperating and not cooperating, meaning that once the firm

starts to cooperate with suppliers there is a significant improvement in EBITDA, continuing with the cooperation does not necessarily imply an improvement in performance.

To complete this result we perform a regression analysis as we did in section 4.1, that is, to analyze the link between cooperation with suppliers and EBITDA by controlling the possible effects of other company variables such as productivity per employee, age, size and business sector (Table 13).

Table 13
EBITDA and cooperation degree (Linear regression model).

	(4)	(5)
Productivity per employee	0.152** (0.017)	0.152** (0.017)
Constant	0.474 (1.789)	-0.460 (1.718)
Cooperation factor	0.675* (0.347)	
(Cooperation factor)^2	-0.398** (0.203)	
Low cooperation		1.276* (0.575)
Medium cooperation		0.565 (0.681)
High cooperation		0.618 (1.135)
Age, F-statistic	4.519**	4.559**
Size, F-statistic	3.071**	2.994*
Sector, F-statistic	2.822**	2.785**
N	1654	1654
Mean dependent var	8.718	8.718
S.D. dependent var	11.619	11.619
R-squared	0.353	0.353
Adjusted R-squared	0.340	0.340
S.E. of regression	9.4377	9.4380
Akaike info criterion	7.3465	7.3471
Schwarz criterion	7.4511	7.4551
F-statistic	28.496**	27.631**
(Standard deviation)		
** $p < 0.01$, * $p < 0.05$		
We have used Heteroscedasticity White robust standard error estimator		

In regression (4) the continuous cooperation indicator obtained from the factor analysis of principal components has been used directly as the explanatory variable, although to test the hypothesis of linearity this cooperation indicator and its square have been included. This linearity proves significant, so greater initial cooperation increases EBITDA, although a further increase in cooperation reduces this. In other words, the relationship between cooperation and EBITDA is an inverted U shape, with the maximum point at 0.842, which indicates that the maximum impact of cooperation with suppliers on EBITDA, once other company variables have been controlled for, is obtained at the low cooperation degree (between zero and one). To directly test this maximum point we include in regression (5) the differential effect of each of the cooperation categories on EBITDA compared to the group of firms that do not cooperate. Similar to the previous ANOVA analysis, the results show that there are only significant differences between the firms that do not cooperate and those with a low cooperation degree (the differences between the

firms that do not cooperate and those with a medium or high cooperation degree are not significant).

In short, we reject hypothesis 2 on demonstrating that only firms with a low cooperation degree have a significant difference in their EBITDA compared to those that do not cooperate, and that a higher cooperation degree compared to weak cooperation does not lead to an increase in EBITDA. This optimal cooperation degree is reached when the firm implements one of the supplier cooperation initiatives, either an exchange of information, mutual dependence or supplier development. To check if any of these three cooperation initiatives has a greater impact than the others, in Table 14 we show the results of regression (6) in which we have exclusively selected the firms with low cooperation (that implement a single cooperation initiative). The results show that there is no significant difference between the cooperation initiatives, so the important thing is to cooperate, not the pattern of cooperation chosen.

Table 14
EBITDA and cooperation initiatives (regression model).

	(6)
Productivity per employee	0.158** (0.019)
Dependence indicator	1.183 (2.877)
Exchange of information	2.095 (2.809)
Supplier development	1.247 (3.088)
Age, F-statistic	2.063
Size, F-statistic	3.018*
Sector, F-statistic	1.276
N	552
Mean dependent var	9.991
S.D. dependent var	11.502
R-squared	0.423
Adjusted R-squared	0.389
S.E. of regression	8.9895
Akaike info criterion	7.2862
Schwarz criterion	7.5363
F-statistic	12.32214**
(Standard deviation)	
** $p < 0.01$, * $p < 0.05$	
We have used Heteroscedasticity White robust standard error estimator	

Therefore, implementing a cooperation initiative initially leads to a higher EBITDA than that of the firms that do not cooperate at all, regardless of the cooperation initiative used, but implementing more than one cooperation initiative does not necessary lead to an additional significant increase in EBITDA, and can even lead to a reduction which reduces the advantage initially achieved.

5. Discussion and conclusion

After studying the different buyer-supplier relationship models and the performance variables that may be affected, we decided to analyze the model used by Spanish manufacturing companies and its effect on the performance. A review of the existing

literature led us to propose that firms that cooperate with their suppliers have better financial performance.

To test our hypothesis we choose the sample of firms that responded to ESEE. However, we faced problems when classifying the firms on the basis of the buyer-supplier model used. As a result, we designed a supplier cooperation indicator from the variables suggested in the existing literature, which are exchange of information, supplier development and mutual dependence. Having classified the sample of firms on the basis of their degree of supplier cooperation, we compared the financial performance of the two groups of firms and found that those that cooperate above average achieve better results. In addition, we looked in more detail at the classification made using the continuous cooperation factor and found that firms can be grouped on the basis of the number of cooperation initiatives implemented. This allowed us to identify four groups of firms and from this classification we demonstrated that firms with a low cooperation degree achieved better financial performance than the rest.

The results obtained in this paper could have important implications for the management of firms given that they provide empirical evidence about the buyer-supplier relationship model. The current environment, due to its dynamism and changing consumer preferences and needs, forces manufacturing companies into a continual process of adaptation and transformation. Given this situation, many firms have chosen to focus on their core activities and outsource the rest, including the manufacture of components needed for the final product. This has led to firms becoming increasingly interested in purchasing management, a role considered ever more important because of the resources that it involves and the influence it can have on the firm. Those responsible for purchasing find themselves in the position of having to establish agreements with their suppliers within the framework of the possible buyer-supplier relationship models, which can range from competitive to cooperative, each with its own specific features.

The cooperative model involves a long-term relationship based on the continuous exchange of information, the implementation of supplier development practices and a high degree of mutual dependence. This requires resources (time, personnel, and money) to be dedicated that may not be reflected in the business performance if the firm chooses to implement several supplier cooperation initiatives. Therefore, the firm must examine in detail the different cooperative initiatives and choose the one that best suits its specific characteristics.

In short, with the results of this research we provide empirical evidence that firms that exchange information with their suppliers, have a high degree of mutual dependence or develop suppliers, in other words, that cooperate with their suppliers, can achieve better financial performance, even when this type of relationship implies more time and resources than a competitive model with suppliers. However, a high degree of cooperation with suppliers does not have a higher impact on financial performance than a low degree of cooperation, which could be due to the level of effort and resources required by that degree of commitment.

5.2. Limitations and further research

We need to take into account that this paper has a series of limitations, derived largely from the information source used: the ESEE. The first limitation arises from the

survey itself, with the research being limited to manufacturing companies in Spain. The second limitation comes from using the ESEE to analyze the buyer-supplier relationship, which means that other dimensions of the relationship such as selection criteria, the duration of the relationship and the specific investments made have not been examined. However, and despite the limitations discussed, the ESEE has allowed us to obtain a large number of observations without needing to deal with the problems involved in collecting information at the individual level.

Finally, the next steps in this research include comparing the results of this paper with ESEE data from previous years, and creating an explanatory model that allows us to identify the reasons behind cooperation with suppliers.

References

- Billington, C., Cordon, C. & Vollmann, T. (2006). Super Supplier Collaboration. *Perspectives for Managers*, 134, 1-4.
- Brulhart, F. (2007). Experience of Partnership, Experience with a Partner, Interpersonal Complicity: What Impact on Success in a Logistic Partnership. *Business Review*, 7, 2, 199-206.
- Burdett, J.D. (1992). A Model for Customer-Supplier Alliances. *Logistics Information Management*, 5, 1, 25-31.
- Cambra Fierro, J.J. & Polo Redondo, Y. (2008). Long-Term Orientation of the Supply Function in the SME Context: Reasons, Determining Factors and Implications. *International Small Business Journal*, 26, 5, 619-646.
- Carr, A.S. & Kaynak, H. (2007). Communication Methods, Information Sharing, Supplier Development and Performance: An Empirical Study of their Relationships. *International Journal of Operations and Production Management*, 27, 4, 346-370.
- Carr, A.S. & Pearson, J.N. (1999). Strategically Managed Buyer-Supplier Relationships and Performance Outcomes. *Journal of Operations Management*, 17, 5, 497-519.
- Carr, A.S. & Pearson, J.N. (2002). The Impact of Purchasing and Supplier Involvement on Strategic Purchasing and Its Impact on Firm's Performance. *International Journal of Operations and Production Management*, 22, 9, 1032-1053.
- Choy, K.L., Lee, W.B. & Lo, W. (2002). Design of a Case Based Intelligent Supplier Relationship Management System. *Expert Systems with Applications*, 23, 3, 281-297.
- Domínguez Serrano, M., Blancas Peral, F.J., Guerrero Casas, F.M. & González Lozano, M. (2011). Una revisión crítica para la construcción de indicadores sintéticos. *Revista de Métodos Cuantitativos para la Economía y la Empresa*, 11, 41-70.
- Elif, A. & Wasti, S. (2009). Revising Trust and Control: Effects on Perceived Relationship Performance. *International Small Business Journal*, 27, 1, 39-69.
- Ellram, L.M. (1990). The Supplier Selection Decision in Strategic Partnerships. *Journal of Purchasing and Materials Management*, 26, 4, 8-14
- Ellram, L.M. (1992a). The Role of the Purchasing Function in Cost Savings Analysis. *International Journal of Purchasing and Materials Management*, 28, 1, 26-33.
- Ellram, L.M. (1992b). International Purchasing Alliances: An Empirical Study. *International Journal of Logistics Management*, 3, 1, 23-36.

- Fossas-Olalla, M., López-Sánchez, J.I. & Minguela-Rata, B. (2010). Cooperation With Suppliers as a Source of Innovation. *African Journal of Business Management*, 4, 16, 3491-3499.
- Germain, R. & Dröge, C. (1997). Effect of Just-In-Time Purchasing Relationships on Organizational Design, Purchasing Department Configuration and Firm Performance. *Industrial Marketing Management*, 26, 2, 115-125.
- González-Benito, J., Suárez-González, I. & Spring, M. (2000). Complementarities Between JIT Purchasing Practices: An Economic Analysis Based on Transaction Costs. *International Journal of Production Economics*, 67, 3, 279-293.
- Groves, G. & Valsamakis, V. (1998). Supplier-Customer Relationships and Company Performance. *International Journal of Logistics Management*, 9, 2, 51-64.
- Hald, K.S., Cordón, C. & Vollmann, T.E. (2009). Towards an Understanding of Attraction in Buyer-Supplier Relationships. *Industrial Marketing Management*, 38, 8, 960-970.
- Handfield, R.B. & Nichols, E.L. (1999). *Introduction to Supply Chain Management*. New York: Prentice Hall.
- Harrison, J.F. y St John, C.H. (1996). Managing and Partnering With External Stakeholders. *Academy of Management Executive*, 10, 2, 46-60.
- Heide, J.B. (1994). Inter-Organizational Governance in Marketing Channels. *Journal of Marketing*, 58, 1, 71-85.
- Heide, J.B. & John, G. (1990). Alliances in Industrial Purchasing: The Determinants of Joint Action in Buyer-Supplier Relationships. *Journal of Marketing Research*, 27, 1, 24-36.
- Helper, S. (1991). Strategy and Irreversibility in Supplier Relations: The Case of the U.S. Auto Industry. *Business History Review*, 65, 781-824.
- Hendrick, T. & Ellram, L.M. (1993). *Strategic Supplier Partnering: An International Study*. Arizona: Center for Advanced Purchasing Studies, National Association of Purchasing Management.
- Hoyt, J. & Huq, F. (2000). From Arms-Length to Collaborative Relationships in the Supply Chain: An Evolutionary Process. *International Journal of Physical Distribution and Logistics Management*, 30, 9, 750-764.
- Inemek, A., & Matthyssens, P. (2012). The impact of buyer-supplier relationships on supplier innovativeness: An empirical study in cross-border supply networks. *Industrial Marketing Management*, <http://dx.doi.org/10.1016/j.indmarman.2012.10.011>
- John, G. (1984). An Empirical Investigation of Some Antecedents of Opportunism in a Marketing Channel. *Journal of Marketing Research*, 21, 278-289.
- Kannan, V.R. & Tan, K.C. (2002). Supplier Selection and Assessment: Their Impact on Business Performance. *Journal of Supply Chain Management*, 38, 4, 11-21.
- Kaynak, H. (1997). *Total Quality Management and Just-In-Time Purchasing: Their Effects on Performance of Firms Operating in the U.S.* New York: Garland.
- Krause, D.R., Scannell, T.V. & Calantone, R.J. (2000). A Structural Analysis of the Effectiveness of Buying Firm's Strategies to Improve Supplier Performance. *Decision Sciences*, 31, 1, 33-55.
- Landeros, R. & Monczka, R.M. (1989). Cooperative Buyer-Seller Relationships and a Firm's Competitive Posture. *Journal of Purchasing and Materials Management*, 25, 3, 9-18.

- Leverick, F. & Cooper, R. (1998). Partnerships in the Motor Industry: Opportunities and Risks for Suppliers. *Long Range Planning*, 31, 1, 72-81.
- Martínez-Senra, A.I., Sartal, A. & Vázquez, X.H. (2012). Tintorerías de Posguerra e Innovación Organizativa en Inditex: Una perspectiva Contractual de la Gestión Lean de la Cadena de Suministro. *Universia Business Review*, 34, 36-51.
- Miñi-Ramírez, A., Arias-Aranda, D. & García-Morales, V.J. (2012). La Gestión de la Logística Inversa en las Empresas Españolas: Hacia las Prácticas de Excelencia. *Universia Business Review*, 33, 70-82.
- Minguela-Rata, B., Fernández-Menéndez, J. & Fossas-Olalla, M. (2011). Colaboración Tecnológica con Proveedores e Innovación en Producto: Un Análisis de la Empresa Manufacturera Española, presented in *7th International Meeting of the Iberoamerican Academy of Management*, Perú.
- Modi, S.B. & Mabert, V.A. (2007). Supplier Development: Improving Supplier Performance Through Knowledge Transfer. *Journal of Operations Management*, 25, 1, 42-64.
- Mummalaneni, V., Dubas, K.M. & Chao, C. (1996). Chinese Purchasing Managers' Preferences and Trade-Offs in Supplier Selection and Performance Evaluation. *Industrial Marketing Management*, 25, 2, 115-124.
- Nieto, M^a J. & Santamaría, L. (2010). Technological Collaboration: Bridging the Innovation Gap Between Small and Large Firms. *Journal of Small Business Management*, 48, 1, 44-69.
- Ou, C.S., Liu, F.C. & Yen, D.C. (2010). A Structural Model of Supply Chain Management on Firm Performance. *International Journal of Operations & Production Management*, 30, 5, 526- 545.
- Plambeck, E., Lee, H.L. & Yatsko, P. (2012). Improvement environmental performance in your Chinese supply chain. *Sloan Management Review*, 53, 2, 42-52.
- Prahinski, C. & Benton, W.C. (2004). Supplier Evaluations: Communication Strategies to Improve Supplier Performance. *Journal of Operations Management*, 22, 1, 39-62.
- Richeson, L., Lackley, C.W. & Starner, J.W. (1995). The Effect of Communication on the Linkage Between Manufacturers and Suppliers in a Just-In-Time Environment. *International Journal of Purchasing and Materials Management*, 31, 1, 21-28.
- Rinehart, L.M., Eckert, J.A., Handfield, R.B., Page, T.J. & Atkin, T. (2004). An Assessment of Supplier-Customer Relationships. *Journal of Business Logistics*, 25, 1, 25-62.
- Shapiro, R. (1985). *Toward Effective Supplier Management: International Comparisons*. Harvard Business School: Working Paper, 85-062.
- Stuart, F.I. (1993). Supplier Partnerships: Influencing Factors and Strategic Benefits. *International Journal of Purchasing and Materials Management*, 29, 4, 22-28.
- Tan, K.C., Kannan, V.R. & Handfield, R.B. (1998). Supply Chain Management: Supplier Performance and Firm Performance. *International Journal of Purchasing and Materials Management*, 34, 3, 2-9.
- Toni, A. De & Nassimbeni, G. (1999). Buyer-Supplier Operational Practices, Sourcing Policies and Plant Performances: Results of an Empirical Research. *International Journal of Production Research*, 37, 3, 597-619.
- Wagner, S.M. (2006). Supplier Development Practices: An Exploratory Study. *European Journal of Marketing*, 40, 5/6, 554-571.

- Walker, G. & Poppo, L. (1991). Profit Center, Single-Source Suppliers and Transaction Costs. *Administrative Science Quarterly*, 36, 66-87.
- Williamson, O.E. (1985). *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*, New York: Free Press.
- Wisner, J.D. (2003). A Structural Equation Model of Supply Chain Management Strategies and Firm Performance. *Journal of Business Logistics*, 24, 1, 1-26.
- Youssef, M.A. (1992). Agile Manufacturing: A Necessary Condition for Competing in Global Markets. *Industrial Engineering*, December 18-19.
- Zsidisin, G.A. & Ellram, L.M. (2003). An Agency Theory Investigation of Supply Risk Management. *Journal of Supply Chain Management*, 39, 3, 15-27.