

LOGISTICS FLEXIBILITY AS A BUSINESS STRATEGY FURNITURE INDUSTRY IN SPAIN

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ABSTRACT

In a highly globalized market in which companies are currently developing, logistics appears as a business strategy applying various organizations to achieve competitive advantage and stay in the market. Market pressure to reduce the costs of goods and increasingly customized products and services, are leading companies to adopt new business strategies, and logistics seems to be a good strategy to achieve their goals. Therefore, in this study with a sample of 322 companies in the furniture industry of Spain examines the impact that these companies flexibility in their logistics processes. The results show that physical supply flexibility, the flexibility of shopping, the physical distribution flexibility and flexibility of demand management positively impact the flexibility of logistics companies, which can be considered as a good business strategy.

Keywords: *Flexibility, flexible logistics.*

1.- INTRODUCTION

The new millennium brings a high level of competitiveness and an uncertain business environment in which organizations, especially small and medium enterprises, have to redesign their business strategies to adapt as quickly as possible to the requirements market demand and, thus, respond quickly and effectively to changes and requirements demanded by customers and consumers (Huber, 1984; Gerwin, 1987; Ward *et al.*, 1998; Narasimhan & Das, 1999; Zhang *et al.*, 2005), since the latter are increasingly seeking a customization of goods and services they buy, which requires companies to loosen up their production and logistics processes (Day, 1994).

However, the term *flexibility* occurs commonly in literature as a construct very complex and generates considerable confusion, as is generally identified with production operations (Oke, 2005). Therefore to avoid this problem the first thing you have to do business, we understand that flexibility refers to the ability of systems to change or react as quickly as possible, with the least effort, cost and performance to the requirements of market (Crowe, 1992; Das & Patel, 2002; Morlok & Chang, 2004; Sánchez & Pérez, 2005). Thus, the ability to react or change by organizations depend periods becoming shorter, a few days or possibly a few years according to market development. Flexibility refers to the *range* or behavior that can reach systems achieve the organization, while the *response* refers to the ease of making changes that the market demand expressed in terms of cost and time. However, when joint flexibility and manufacturing companies (*flexible manufacturing*) the dimensions are different from previous, because the flexibility of manufacturing have the *intern dimension*, which describes the behavior of systems and these can be assessed externally by customers and consumers (*external dimension*), who determine the current or future performance of the products and services of the organization (Oke, 2005).

Thus, the internal attributes of the flexibility of the manufacturing companies, such as the flexibility of the machine and the flexibility of the routes are considered internal types of flexibility, while external attributes such as flexibility in the volume, flexibility of delivery and flexibility of orders are defined as external flexibility types. This categorization is essential because it allows differentiation between internal attributes and external competitive endeavors of its business, and this is important because, according to Oke (2005), there must be a combination of both types of flexibility to achieve better results. A suitable combination of these two types of flexibility is in the flexibility of logistics, since it allows organizations satisfy market demand, predicting future sales and react orders, as well as providing support to the production and provides information to coordinate the ordering and delivery of orders to customers and consumers. therefore on the flexibility of logistics companies can defer their commitments, accept changes and consolidate deliveries thereby covering the needs specific customers and consumers

(Zhang *et al.*, 2005). This research analyzes the importance of flexibility logistics as a business strategy in companies in the furniture industry in Spain, using an empirical study with a sample of 322 companies as one of the most important industries of the Spanish economy, using structural equation methodology and enabling debate on this important construct.

2.-LITERATURE REVIEW

The review of the literature on enterprise flexibility indicates that the efforts of a large part of the studies have focused on the impact of flexibility in information technology (Byrd & Turner, 2000; Palanisamy & Sushil, 2003; Gebauer & Schober, 2006), organizational processes (Maier, 1981; Keong *et al.*, 2005; Tan & Sia, 2006; Verdú-Jover *et al.*, 2006), strategic management (Evans, 1991; Sanchez, 1995; Volberda 1996; Zaheer & Zaheer, 1997), production (Gupta & Goyal, 1989; Sethi & Sethi, 1990; Upton, 1994; Vokurka & O'Leary-Kelly, 2000; Oke, 2005; Julie, 2005; Kayis & Kara, 2005; Chang *et al.*, 2005), but the literature on the flexibility of logistics is very low (Closs *et al.*, 2005; Zhang *et al.*, 2005; Sánchez & Pérez, 2005). In this context, De Toni & Tonchia (1998) and Sanchez & Perez (2005) concluded in their studies that the flexibility of the supply chain and logistics has received little attention from researchers and academics, however, most of the literature has focused on the analysis and discussion of the flexibility within organizations. Therefore, De Toni and Tonchia (1998) considered the need to delve deeper into research on other forms of flexibility, including the distribution and logistics, because the flexibility of logistics can generate greater competitive advantage for the companies.

Meanwhile, Sanchez & Perez (2005) developed a related model in which flexibility and performance capabilities of the companies, and categorized the flexibility of the supply chain in two basic types: the process flexibility and flexible logistics. Zhang *et al.*, (2005) suggested that intensified research and discussion on the flexibility of logistics, since it improves efficiency and provides better service to customers and consumers. Meanwhile, Zhang *et al.* (2005) considered one of the most important business strategies today is the flexibility of logistics, which defined it as the ability of companies to respond quickly and efficiently to changes in customer needs in terms of improving orders, support and services. Sanchez & Perez (2005) also concluded that logistics flexibility is essential in organizations, and they defined it as the ability to move or transport the production of products of a particular place to another within the supply chain. The authors also suggested that the flexibility of logistics strategy may depend on resource companies, such as business facilities and components or raw materials. Therefore, the degree of flexibility of logistics depends on having the ability for organizations requiring resources among its suppliers. In this context, the flexibility of logistics began to take a relatively large increase after Newman *et al.* (1993) developed the *dynamic equilibrium model*, including uncertainty in the systems market, flexibility and inventory reduction. Recently, in the early of 2000, the flexibility of logistics has taken a greater interest due to frequent market fluctuations and reducing life cycle of products, as consumers demand products and services increasingly tailored their needs, which requires companies to have more flexibility in the manufacturing strategy, accompanied by rapid development and introduction of new products (Keong *et al.*, 2005).

Thus, among the few studies on this important topic, the one conducted by Day (1994) is one of the most important and most frequently mentioned in the literature. This author concluded that the flexibility of logistics consists of four elements: *physical supply flexibility*, *flexibility of shopping*, *physical distribution flexibility* and *flexibility for the running on of the application*, which allow companies increase customer satisfaction and consumers. The physical supply flexibility is defined by as the ability of companies to provide internally, in a fast and efficient, a wide variety of raw materials for production (Day (1994). Therefore, the physical supply is an activity that generates a lot of information and are those processes that are implemented logistics before and during the production process: raw material storage, inventory control and internal transport (Ernst & Whinney, 1987; Langley & Holcomb, 1992; Zhang *et al.*, 2002, 2005).

Likewise, domestic transportation services (transit time, frequency of deliveries, costs and damages for loss occurrence and transport), impacts the inventory level of the company, in the delivery of orders, so we can consider that the physical supply indirectly impact on customers and consumers, through the

delivery of orders quickly, efficiently, in the shortest time possible and with the lower cost to customers. Thus, physical supply flexibility facilitates the movement of raw materials originate from production site to quickly and efficiently (Ferrin, 1994; Zhang *et al.*, 2005), requiring only the transport assembly work, distribution, storage and inventory control (Ernst & Whinney, 1987). Also, so that you can implement this type of shift quickly and effectively, requires first determine the type of transport to be used, the frequency and size of shipments, schedule deliveries of orders, receipt orders and establishing policies replenishment. Therefore, the time it takes internal transport impact the inventory level, the frequency of the stocks and the use of material handling equipment companies, and facilitate the availability of supply and the mix of products, which directly impact on the flexibility of the logistics companies (Ernst & Whinney, 1987; Day, 1994; Ferrin, 1994; Zhang *et al.*,2005). So, right now we propose the following hypothesis:

H1: a high level of physical supply flexibility, generates a high level of flexibility of logistics companies in the furniture sector in Spain.

The shopping flexibility is defined as the ability of companies to make contracts for the purchase of raw materials required to quickly and effectively through cooperative relationships with their suppliers (Day,1994). In addition, suppliers are evaluated by their response capabilities, and companies implement partnerships with these providers, creating a close relationship coordination, participation and communication (Day, 1994; Zhang *et al.*, 2002, 2005). Therefore can be considered as raw material purchases of businesses indirectly impact on customers through quality, speed and costs generated by deliveries from suppliers, can thereby creating a competitive advantage through the efforts of improving the quality and reducing the delivery time (Zhang *et al.*, 2005). So, shopping is an essential element in business that requires a good selection of suppliers, and requires a coordinated series of interactions with different suppliers, so that organizations apply quality raw materials, build relationships develop mutual trust and long term relationships with its suppliers. Therefore shopping flexibility facilitates collaboration with suppliers, leading to a higher level of coordination, communication and participation (Day, 1994, Zhang *et al.* , 2005), providing businesses with the acquisition of the raw materials needed for production and delivery of products required by customers, in time and the amount required, thereby increasing the flexibility of logistics enterprises. Based this information can now pose the following hypothesis:

H2: a high level of flexibility of purchases, generates a high level of flexibility of the logistics companies in the furniture sector in Spain.

Regarding the physical distribution flexibility, is defined as the ability of firms to adjust inventory, packaging, storage and physical transport of products that meet the needs of customers in a fast and effective (Zhang *et al.*, 2002, 2005). Moreover, the flexibility of physical distribution includes flows of materials and information and streamlines the activities of packaging, storage and transportation of products required by customers, so these activities are extremely important as a strategic response, as they are totally transparent to clients. Therefore, it can be considered that the physical distribution impacts directly to customers, by quality and fast delivery product (Zhang *et al.*, 2005). Similarly, the physical distribution flexibility requires adaptability of all those activities, which are related to meeting the needs of customers, ie, those activities that serve as liaison between the company and its customers. Addition, the physical distribution flexibility facilitates coordination of activities of packaging, final assembly of products, product configuration, inventory management and transport of products (Van Hoek, 2001; Zhang *et al.*,2005), allowing the customer satisfaction of the supply chain through customization of products and services with low costs, thereby improving the flexibility of logistics companies. Based on this information we propose the following hypothesis :

H3: a high level of flexibility in the physical distribution, generating a high level of flexibility of the logistics companies in the furniture sector in Spain.

Finally, the flexibility of demand management can be defined as the ability of companies to respond to the diverse needs of service, price, delivery time required by customers quickly and effectively (Day, 1994). Therefore, we consider that the flexibility of demand management is an information-intensive and market

perception, and is based on the creation and management of customer relationships (Day, 1994; Lee, 2001; Zhang *et al.*, 2002, 2005). Likewise, the changing tastes and needs of customers and increasing competition are creating an environment in which companies have to pay more attention to improve the expectations and experiences of its customers (Lengnick-Hall, 1996; Zhang *et al.*, 2005). In this sense, the flexibility of demand management improvement activities billing, repair and installation of products, receiving and inspection of returns and development of products and services required by customers (Day, 1994), reducing the time deliveries of orders and price of the products (Day, 1994, Zhang *et al.*, 2005). All these activities include extensive work with clients to determine the timing of deliveries and product prices, thereby improving both customer service and the flexibility of logistics companies. Thus, the next hypothesis to propose, is:

H4: a high level of flexibility of demand management, generates a high level of flexibility of the logistics companies in the furniture sector in Spain.

3.- METHODOLOGY

To validate the hypotheses was conducted empirical research on the companies in the furniture industry of Spain. During the first phase of the study, a qualitative research was applied in which it carried out 10 interviews with those responsible for the logistics area 10 companies in the furniture industry of Valencia. The results obtained in this first phase, allowed a better understanding of the situation of the sector and were a great help in the correct definition of the survey used in the qualitative phase. Also, the procedure used in this study for the framework, was to get the directory of companies with 20 workers or more people, counting with the support of the National Association of Manufacturers and Exporters Furniture from Spain (NAMEFS) and the International Furniture Fair of Valencia (IFV), obtaining a final directory of 500 companies, representing a little over 38% of the total study population (1,300). It should be noted that companies associated with NAMEFS, like the companies exhibiting at the IFV, belong to several organizations, both regional and national, so the work is not focused on a particular group or association.

Similarly, the survey was designed to be answered by the logistics managers of companies in the furniture industry of 16 autonomous regions of Spain, and was sent by mail to each of the 500 selected companies, which are 334 received, of which 12 were eliminated for not meeting the requirements, being, thus, a total of 322 surveys were validated with an error of 4. 8%. Thus was obtained a response rate of 53%. Worth mentioning that all respondents are logistics professionals and specialists in the field of furniture, which have been working in the industry for several years. This allowed the interviewees provide valuable information and interesting by having deep knowledge of the industry. **Table 1** summarizes the most relevant aspects of the research carried out.

Table 1. Technical Research

| Features | Survey |
|---------------------------|---|
| Universe | 1,300 Companies in the Furniture Industry |
| Scope | National (Spain) |
| Sample Unit | Furniture Companies with over 20 employees |
| Collection Method of Data | Postal Survey |
| Sampling Rate | Simple Random |
| Sample Size | 500 |
| Margin of Sampling Error | +/-4% globally to a confidence level of 97% (p=q=0.5) |
| Date of Fieldwork | November 2006- January 2007 |

Source: Instituto Tecnológico del Mueble, Madera y Embalaje

4.- DEVELOPMENT OF MEASURES

Regarding the development of the measures, physical supply flexibility was measured with a 6-item scale adapted from Langley & Holcomb (1992), Day (1994), Carter & Narasimhan (1994), Bowersox & Closs (1996) and Zhang *et al.* (2005). Purchases flexibility was measured with a scale of 6 items and was adapted from Porter (1985), Ernst & Whinney (1987), and Narasimhan & Carter (1998), Van Hoek (2001)

and Zhang *et al.*(2005). The scale of the flexibility of physical distribution was measured with a 6-item scale, adapted from Langley & Holcomb (1992), Lambert & Stock (1993), Day (1994), Cooper *et al.* (1997), Van Hoek *et al.*(1998) and Zhang *et al.* (2005). Finally, the flexibility of demand management was measured with a 5-item scale and was adapted from Langley & Holcomb (1992), Day (1994), Lengnick-Hall (1996), Lee (2001) and Zhang *et al.* (2005). All items were measured with Likert scale of 5 positions: 1 = strongly disagree and 5 = complete agreement as limits.

5.- RELIABILITY AND VALIDITY

The to reliability and validity of the measurement scales was assessed using confirmatory factor analysis (CFA) using the maximum likelihood method with EQS 6.1 software (Bentler and Wu, 2010; Brown, 2006; Byrne, 2006). Similarly, the reliability of the measurement scales was assessed from the Cronbach's *alpha* and composite reliability index (IFC) (Bagozzi & Yi, 1988). All scale values exceeded the recommended value of 0.7 for Cronbach's *alpha* and the IFC, which indicates that there is evidence justifies reliability and internal reliability of the scales (Nunnally & Bernstein, 1994, Hair *et al.*, 1995). The analyzed data directly from the database show evidence of a non-normal distribution (standard coefficient estimate M= 40.20), which is used when other methods of estimation assumes that normality is present, this will follow recommendations Chou, *et al.* (1991) and Hu, *et al.* (1992) for the correction of statistical estimation model used. Thus, in this research we used robust statistical (Satorra & Bentler, 1988) to provide better evidence of statistical adjustments. The settings that were used in this study were the Normalized Fit Index (NFI), the non-standard Fit Index (NNFI), the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA) (Bentler & Bonnet, 1980; Byrne, 2006; Bentler, 1990; Hair *et al.* 1995; Chau 1997; Heck, 1998). Values of NFI, NNFI and CFI between 0.80 and 0.89 represent a reasonable fit (Hair, et al.,2010) and a value equal to or greater than 0.90 represents an evidence of a good fit of the theoretical model (Byrne, 2006). RMSEA Values below 0. acceptable 080 (Hair *et al.*, 1995). The results of the application of AFC are presented in **Table 2** and suggests that the model provides a good fit to the data ($S-BX^2 = 219.071$; $df = 98$; $p = 0.000$; $NFI = 0.927$; $NNFI = 0.948$; $CFI = 0.958$; $y RMSEA = 0.062$). Addition, Cronbach's *alpha* and the IFC exceed the value of 0.70 recommended by Nunnally and Bernstein (1994) and the rate of variance extracted (IVE) was calculated for each pair of constructs, resulting in an IVE than 0.50 (Fornell & Larcker, 1981). As evidence of convergent validity, the results indicate that all of the AFC items factor Related are significant ($p < 0. 001$) and the size of all the factor loadings is standarized around 0. 60 (Bagozzi & Yi, 1988).

Table 2. Internal consistency and convergent validity of the theoretical model

| Variable | Indicator | Factorial Charge | t Value | Cronbach's Alpha | IFC | IVE |
|---|-----------|------------------|--------------------|------------------|------------------|-------|
| Physical Supply Flexibility | PS1 | 0.619*** | 1.000 ^a | 0.784 | 0.789 | 0.515 |
| | PS2 | 0.720*** | 10.729 | | | |
| | PS5 | 0.719*** | 10.511 | | | |
| | PS6 | 0.739*** | 9.274 | | | |
| Flexibility of Purchases | PF1 | 0.711*** | 1.000 ^a | 0.844 | 0.846 | 0.525 |
| | PF2 | 0.758*** | 14.083 | | | |
| | PF3 | 0.706*** | 10.050 | | | |
| | PF4 | 0.705*** | 11.696 | | | |
| | PF6 | 0.740*** | 12.311 | | | |
| Flexibility in the Physical Distribution | PD1 | 0.741*** | 1.000 ^a | 0.744 | 0.775 | 0.536 |
| | PD4 | 0.678*** | 13.097 | | | |
| | PD6 | 0.773*** | 14.058 | | | |
| Flexibility of Demand Management | DM1 | 0.780*** | 1.000 ^a | 0.826 | 0.828 | 0.546 |
| | DM2 | 0.768*** | 14.248 | | | |
| | DM3 | 0.694*** | 11.715 | | | |
| | DM5 | 0.710*** | 12.934 | | | |
| S-B $X^2_{(df=98)}$ =219.071 ($p < 0.000$); NFI=0.927; NNFI=0.948; CFI=0.958; RMSEA=0.062 | | | | | | |
| Parameters constrained to the value in the identification process. | | | | | ***= $p < 0.001$ | |

Source: own

According to the evidence of the validity discriminant measure is provided in two forms which can be seen in **Table 3**. First, with a 95% interval of confidentiality, none of the individual elements of the latent factors correlation matrix contains 1.0 (Anderson & Gerbing, 1988). Second, extracted variance between the two constructs is greater than its corresponding IVE (Fornell & Larcker, 1981). Based on these criteria, we can conclude that the different measurements with the model show sufficient evidence of reliability and convergent and discriminant validity .

Table 3. Discriminant validity of the theoretical model

| Variables | 1 | 2 | 3 | 4 |
|--|--------------|--------------|--------------|-------|
| Physical Supply Flexibility | 0.515 | 0.137 | 0.191 | 0.151 |
| Flexibility of Purchases | 0.290, 0.450 | 0.525 | 0.223 | 0.207 |
| Flexibility in the Physical Distribution | 0.343, 0.531 | 0.376, 0.568 | 0.536 | 0.297 |
| Flexibility of Demand Management | 0.305, 0.473 | 0.361, 0.549 | 0.441, 0.649 | 0.546 |

The diagonal represents the index of variance extracted, while above the diagonal part presents the variance (the correlation squared), below the diagonal, is an estimate of the correlation of factors with a confidence interval of 95%.

Source: own

6.-RESULTS

To obtain the statistical results of the research hypotheses, we conducted a structural equation model (SEM) with the same variables to check the model structure and obtain the results that would allow the hypotheses posed, using the software EQS 6.1 (Bentler and Wu, 2012; Byrne, 2006; Brown, 2006). Furthermore, the nomological validity of the theoretical model was tested using the chi square, through which the theoretical model was compared with the adjusted model. The results indicate that no significant differences are good theoretical model in explaining the observed relationships between latent constructs (Anderson & Gerbing, 1988; Hatcher, 1994). Results of the application of MEC are presented in **Table 4**:

Table 4. Results of hypothesis testing of the theoretical model

| Hypothesis | Structural Relation | Standardized Coefficient | t Value |
|---|---|--------------------------|---------|
| H1 : a high level of physical supply flexibility, generates a high level of flexibility of logistics companies in the furniture sector in Spain. | Physical Supply Flexibility → of Logistics | 0.992*** | 11.552 |
| H2 : a high level of flexibility of purchases, generates a high level of flexibility of the logistics companies in the furniture sector in Spain. | Flexibility of Purchases → of Logistics | 0.995*** | 13.759 |
| H3 : a high level of flexibility in the physical distribution, generating a high level of flexibility of the logistics companies in the furniture sector in Spain. | Flexibility in the Physical Distribution → of Logistics | 0.997*** | 14.903 |
| H4 : a high level of flexibility of demand management, generates a high level of flexibility of the logistics companies in the furniture sector in Spain. | Flexibility of Demand Management → of Logistics | 0.991*** | 11.258 |

S-B χ^2 (94)=23,6169; p=0.000 ; NFI=0.910 ; NNFI=0.921 ; CFI=0.938; RMSEA= 0.078
 ***= p < 0.001

Source: own

Table 4 can be seen the results obtained from applying the SEM, which in reference to the results **H1** ($\beta = 0.992$, $p < 0.001$) indicates that flexible and physical supply has Positive effect Significant flexibility of logistics. The hypothesis **H2** the result obtained ($\beta = 0.995$, $p < 0.001$) indicates that flexibility in the shopping has significant positive effects on flexibility of logistics.

The results obtained in **H3** ($\beta = 0.997$, $p < 0.001$) indicates that the flexibility of physical distribution has significant positive effects on the flexibility of logistics. Finally, for **H4** results ($B = 0.991$, $p < 0.001$)

indicates that the flexibility of management of demand has significant positive effects on flexibility of logistics. In brief, we can check and conclude that the four variables measuring the flexibility of logistics, have positive and significant and are very similar in terms of the value that each brings.

Therefore, it is found that both physical supply flexibility and flexibility of the purchases, such as flexibility and physical distribution management flexibility of application seem to be good indicators of measuring the flexibility of logistics companies that make up the furniture industry of Spain.

7.- DISCUSSION AND CONCLUSIONS

Although actually increased the number of works dealing with the logistics flexibility, studies take a balanced view between the positive and negative effects resulting in companies. Therefore, the results obtained in this study are interesting and helpful to businesses as they demonstrate that the flexibility of logistics is beneficial for organizations. In this sense, it could be concluded that today can develop a flexible logistics activities of the companies, and the effects of it are positive for the organizations that implement it.

By other hand, to increase the level of business performance, logistics systems should be organized in such a way as to respond effectively and efficiently to customer needs and competitive costs. In this sense, logistics systems must anticipate future sales, so shipments will be made as early as possible through appropriate distribution channels, in the sense of having the availability of products when customers require them. In addition, companies can achieve better performance if their logistics systems more flexible, allowing a rapid replenishment of materials and efficiency in the delivery of products to consumers.

Therefore, logistics flexibility allows organizations to customize products and services without increasing the level of stock. Furthermore, the flexibility of logistics companies can offer new services such as the addition of future products or provide specific packaging, labeling and classification of products that can be aligned without any problems to the individual needs of customers. In this sense, information exchange systems that provide logistics companies also need to be flexible to allow efficient coordination between production and delivery of products to customers.

Under these circumstances, information becomes an important complement inventory and, thus, the flow of information in addition to the material flow (Closs *et al.*, 1997). Therefore companies who make decisions based on global information, may have better outcomes than those who make decisions separating both functions. Also, an efficient coordination of different information flows and demand, production capacity, inventory and schedules shipments along the supply chain, it becomes essential to respond quickly to customer demand, thereby reducing inventories and costs associated with the acceleration of shipments. In this sense, investment in information technology to streamline costs, is a key element to increase the flexibility of logistics and improve service to customers.

Finally, companies need to further involve the various departments in the decisions made in logistics systems, as the decisions made will affect the entire organization as a whole. Therefore, companies must seek new measures to better measure the performance of the various activities of the flexibility of logistics. Additionally, the various departments of the companies may have different levels of flexibility and different impacts on the organization's performance. Today, the furniture sector in Spain probably has great potential in the development and benefits of the flexibility of logistics.

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