

# Supply chain configurations in a global environment: A longitudinal perspective

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**Abstract** In the last few years, companies have paid growing attention to the management of their supply chain at a global level. The need for better suppliers, international competition and research of specific competences have forced companies to improve their ability to cope with suppliers and customers located in different countries around the world. This paper aims to provide an overview of how manufacturing companies use global supply chains and how their behaviour changes over time. Longitudinal data from a sample of companies from the last two editions of the International Manufacturing Strategy Survey (IMSS) are used. A contingent analysis of manufacturing localiza-

tion and globalization is also considered in order to identify factors influencing supply chain globalization strategies.

**Keywords** Global sourcing · Global distribution · Longitudinal analysis · IMSS

## 1 Introduction

During the last 20 years companies have witnessed a considerable expansion of supply chains into international locations (Dornier et al. 1998). Supply chain management has become an international phenomenon that involves the challenges of globalization. This growth in globalization has motivated both practitioner and academic interest in global supply chain management (Prasad and Babbar 2000). The reasons for this growing attention are many. International manufacturing sources have been sought out by managers because of reduced cost, increased revenues and improved reliability (Dornier et al. 1998). Manufacturers typically set up foreign factories to benefit from cost reduction, conform to custom duties and trade concessions, gain from low-cost direct labour, collect on capital subsidies and reduce logistics costs in foreign markets (Ferdows 1997). Additional reasons include exploiting distribution channels, gaining access to overseas markets, capitalizing on greater proximity to customers and improving reliability (Frear et al. 1992; Kotabe and Murray 1990). Counterbalancing these benefits is the fact that global supply chains are more difficult to manage than domestic supply chains (Dornier et al. 1998; MacCarthy and Atthirawong 2003). Geographical distances not only increase transportation costs but also complicate decisions because of inventory cost tradeoffs resulting from increased lead-time in the supply chain. Moreover, different local

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cultures diminish the effectiveness of business processes. Similarly, infrastructural deficiencies in developing countries (e.g., transportation and telecommunications, inadequate worker skills, supplier availability, supplier quality, etc.) provide challenges normally not experienced in developed countries (Meixell and Gargeya 2005). Furthermore, global supply chains carry specific risks such as variability and uncertainty in currency exchange rates, economic and political instability and changes in the regulatory environment (Dornier et al. 1998; Carter and Vickery 1989). For these reasons, companies have always paid relevant attention to the choice of *where* and *how* to invest in extending their supply chains.

The main goal of this paper is to investigate the evolution of the globalization of the supply chain within manufacturing firms. Specifically, this paper aims to address the following issues:

1. First, we aim to identify the global supply chain configurations, in terms of sourcing and distribution, adopted by manufacturing firms around the world.
2. Second, since there is a common perception that the level of globalization of supply chains is increasing, we would like to verify this assumption with actual data.
3. Finally, we aim to gain a deeper understanding of the impact of contingent factors on the level of globalization of the supply chain. In particular, we focused our analysis on globalization and the location of manufacturing in order to investigate the effect of manufacturing characteristics on the supply chain.

The remainder of the paper is structured as follows: in the next section, a literature review on global supply chain management is provided, and the theoretical background for the research objectives is detailed. Then, the research methodology adopted is described. In the following sections, empirical results are provided and managerial implications are discussed. At the paper's end, some conclusions are drawn, and future developments are discussed.

## 2 Literature review and research questions

When discussing the global supply chain, researchers usually refer to three main operational processes: *global sourcing* (e.g., Murray et al. 1995), i.e., the management of supplier relationships from a global perspective; *global manufacturing*, i.e., the management of manufacturing activities distributed all over the world (e.g., MacCarthy and Atthirawong 2003); and *global distribution*, i.e. how companies manage their sales and distribution channels globally (e.g., Bello et al. 2004). The literature has typically analysed these processes separately; it must be noted,

however, that these three issues are strictly linked. Sometimes companies, in order to support global distribution, need to invest in new foreign plants and manage suppliers on a global scale (Buckley and Ghauri 2004). In the same way, companies that start managing purchasing on a global scale sometimes decide to invest in manufacturing facilities abroad in order to have better control over the supply chain (Ferdows 1997). For this reason, these different concepts are usually considered interrelated, and they are referred to under the term global supply chain management (Prasad and Babbar 2000). The literature, however, provides limited research regarding which configurations are adopted in managing a supply chain in a global environment. For this reason, we formulate the following research question:

- RQ1. What are the global supply chain configurations adopted by manufacturing firms in terms of global sourcing and distribution?

The literature lacks clear evidence regarding the evolution of global supply chain configurations over time. Zou and Cavusgil (1996) point out that globalization, strategy and performance topics have a strong longitudinal component (Porter 1991); nevertheless, no longitudinal, survey-based study is cited. In their literature review on supply chain design, and specifically on the globalization topic, Meixell and Gargeya (2005) do not cite any research adopting an evolutionary approach on the topic. Similarly, Power (2005), reviewing literature on supply chain management integration and implementation, found only one contribution, by Stuart (1997), adopting a longitudinal perspective.

Some attempts have been made recently to provide an evaluation of the trend of globalization of supply chains. Webb et al. (2006) reported on the effect of globalization by studying the UK electronics manufacturing industry between 1997 and 2003. Kim and Shin (2002) found an increase of globalization using longitudinal data on international commodity trade (and not on single companies) and analyzing them using the social network approach. Magnani and Prentice (2003), using a comprehensive data set of US manufacturing industries from 1973 to 1994, tested the hypothesis that domestic and international competition directly reduces unionization. Overall, there seems to be room for improvement in the understanding of how global supply chain management has evolved over time. For this reason, we formulate the following research question:

- RQ2. How have global supply chain configurations changed in the last years?

The analysis of the reasons that lead companies to globalize their supply chain has led researchers to investi-

gate the impact of contingencies. There are several influencing factors that have been deeply discussed in the current literature. Company size has been considered as a major variable in the explanation of global strategies. Smaller companies tend to be more reactive towards international purchasing (Scully and Fawcett 1994; Quintens et al. 2005); however, they may face difficulties, since appropriate resources are required to effectively operate purchasing on a global scale (Narasimhan and Carter 1990).

Institutional factors have also been considered, such as regulative and normative elements (Grewal and Dharwadkar 2002). These may influence the ability of companies to develop relationships with customers and suppliers overseas, thus reducing the possibility of extending the supply chain.

Furthermore, the home country of the plant influences how the global supply chain is managed (Thorelli and Glowacka 1995). In this light, cultural elements have been considered relevant. As is presupposed by Hofstede's (2001) typologies, companies belonging to countries that have cultural differences may adopt different approaches to manage customers and suppliers internationally (Monczka and Giunipero 1984; Bello et al. 2004; Quintens et al. 2005). Similarly, the country where the foreign supplier or customer is located has been found to play a role (Quintens et al. 2005).

Quite interestingly, however, only limited research can be found regarding the impact of the location of the manufacturing plant on global supply chain. This topic is rather challenging for managers, since those developing several manufacturing plants in different countries need to consider the impact on the supply chain that extends globally. For this reason we formulate the following research question:

RQ3. What is the impact of globalization and location of manufacturing on the adoption of global supply chain configurations?

### 3 Research methodology

In order to investigate the above research questions, data were collected from the fourth edition of the International Manufacturing Strategy Survey, the results of a research project carried out in 2005 by a global network (IMSS IV), and compared with those collected in 2001 (IMSS III). This project, originally launched by London Business School and Chalmers University of Technology, studies manufacturing and supply chain strategies within the assembly industry (ISIC 28–35 classification) through a detailed questionnaire administered simultaneously in many countries by local research groups. Responses were gathered in a unique global database (Lindberg et al. 1998).

The two samples, namely IMSS IV and III, consist, respectively, of 711 and 558 firms from 23 and 17 countries, with an average response rate of 12% and 34%. The usable samples included, respectively, 634 and 456 firms, which provided enough information for the purpose of this study. The distribution of the samples in terms of country, industry and size is shown in the Electronic Appendix (Table A.1, A.2 and A.3).

To measure globalization of sourcing and distribution, we used the percentage of purchases and sales outside the region where the plant is based<sup>1</sup>. Descriptive statistics for such variables in both samples are shown in the Electronic Appendix (Table A.4). Since the two variables are not normally distributed, non-parametric tests have been adopted in the analyses. The average values of both global sourcing and global distribution are quite low (about 15%), and even if the two variables are correlated (Pearson's correlation of 0.370 for IMSS IV sample and 0.404 for IMSS III sample, sig. < 0.001), global distribution is statistically higher than sourcing in both samples. This means that, even if globalization of sourcing and distribution is still not much diffused, companies tend to adopt both strategies simultaneously, with a preference for global distribution.

In order to study global supply chain configurations (RQ1), a two-step cluster analysis has been performed with the IMSS IV data, with the purpose of identifying existing configurations of global sourcing and distribution. First, hierarchical cluster analysis, based on the method of linkage between groups and squared Euclidean distance, was used to identify the most suitable number of clusters. Afterwards, K-means clustering algorithm was used to iteratively assign each firm to a cluster (Ketchen and Shook 1996). Each cluster obtained in this way represents a different global supply chain configuration, since different levels of both global sourcing and distribution characterize it. Subsequently, the same analysis was replicated on IMSS III data, and the resulting clusters were compared with the previous ones in order to analyze the evolutionary trends.

In the IMSS IV database analysis, the hierarchical analysis suggests considering either two clusters (those companies that use neither global sourcing nor distribution in one, and those who use at least one of the two in the other) or four clusters. The latter solution seems more

<sup>1</sup> Five regions have been investigated in this work, namely South America, North America, West Europe, East Europe & Middle East. East Europe and Middle East have been considered together because the countries in the database coming from the Middle East area are Turkey and Israel, which can be considered, from a trade perspective, closer to Europe rather than to other Middle Eastern countries. The existence of a Customs Union agreement since 1995 between Europe and Turkey and the fact that Israel is one of the EU's most established trading partners in the Euromed area ranking as the EU's 25th major trade partner reinforce this assumption.

intuitive and provides us with the opportunity to better understand empirical results. Moreover, in the IMSS III analysis, the hierarchical method suggests adopting four clusters; thus we applied to both samples the K-Means cluster analysis, with four as the cluster number.

In order to gain a longitudinal perspective (RQ2), we compared data collected within two subsequent releases of the same research project. These data were very similar despite single respondents likely being unrelated. We considered this choice suitable, since our main goal was not to study individual firms but rather to compare two similar samples, in the same industry and economic areas. Fortunately, a sub-set of firms contributed to both editions of the research, thus allowing us also to investigate the same companies over time (strict longitudinality). The strictly longitudinal sub-sample consists of 71 European companies overall, among which only 59 provided enough data for our purposes. The distribution of the strictly longitudinal sample in terms of country, industry and size is shown in the Electronic Appendix (Table A.5).

The literature has provided few contributions on supply chain management that adopt a longitudinal approach. It is no surprise then to discover that longitudinal survey-based methodology is rarely used in operations management research, particularly in the manufacturing strategy field (Dangayach and Deshmukh 2001). This may possibly be a result of the difficulties that emerge when performing longitudinal survey-based studies, especially over long time intervals. First, the same companies have to be considered in the different editions of data collection, yet companies may change over time (e.g., change their business) or disappear (e.g., bankruptcy). Second, managers change inside companies, so their availability to provide information cannot be assured. Lastly, the research interest should remain stable throughout time, in order to set up a new edition of a survey where almost the same items have been already asked in the past.

Still, longitudinal studies can provide useful and interesting insights into how strategies and practices evolve over time and in relation to the changes in the economic and business context, as strategy and performance topics have a characteristically longitudinal nature (Porter 1991).

Among the few contributions that succeeded in adopting a longitudinal approach, we can highlight Kempainen and Vepsäläinen (2003), who performed a longitudinal research to study trends in industrial supply chains and networks and Giunipero et al. (2005), who analyzed JIT purchasing practices through a longitudinal study.

In this study, we are interested in the general shift of the sample—i.e. the increase of, separately, global sourcing and global distribution of the different samples. To do so, we analysed trends at three different levels: first, we compared the two overall samples; then, the same analysis was

repeated at the cluster level, in order to assess whether different clusters behave differently (e.g., one cluster could invest only in global sourcing or in global distribution). Lastly, to support these results, we verified the changes occurred over time on global sourcing and global distribution using the strictly longitudinal sub-sample one company at a time.

To evaluate the impact of contingencies (RQ3), we selected three main variables based on the discussion of the previous literature: company size (number of employees), location of production (region where the plant is located), globalization of production (whether the company has plants in multiple regions). The three samples (IMSS III, IMSS IV and the strict longitudinal sample) have been analyzed in terms of contingent variables; in the next sections, only the results on the IMSS IV sample are detailed. Differences between the IMSS III and the strict longitudinal analysis are summarized for the sake of brevity.

## 4 Results: trends in global sourcing and distribution

### 4.1 Global supply chain configurations

Based on cluster analysis results, we defined four clusters (Table 1) that were named according to the strategy adopted:

- **Local Supply Chain:** these companies adopt both global sourcing and global distribution to a very limited extent (approx 5% of the total in IMSS III and 8% in IMSS IV); thus, they focus on their local supply chain.
- **Global Seller:** in this cluster we find those companies that have invested mainly in the global distribution towards their final customers, thus serving customers all around the world, while they buy mainly locally.
- **Global Purchaser:** likewise, these are companies that have globally developed their sourcing chain in order to serve primarily their local market.
- **Global Supply Chain:** finally, this cluster represents those companies that turn globally both for sourcing and for distribution, thus managing a real global supply chain.

Table 1 provides evidence of several interesting issues. The distribution of companies in the four clusters shows a high number of companies (65% in both samples) focusing mainly on their local supply chain without adopting much internationalization of the supply chain outside their continent. Only a limited number of companies (between 5% and 6% in the two samples) belong to the Global Supply Chain cluster; thus, only a limited number of



**Table 1** Composition of the clusters and changes in the % sourcing and distribution between the two samples

	IMSS III				IMSS IV				Delta sourcing <sup>a</sup>	Delta distrib. <sup>b</sup>
	Sourcing	Distrib.	N	%	Sourcing	Distrib.	N	%		
Local supply chain	4.1%	5.2%	293	64%	7.7%	8.2%	410	65%	3.5%**	3.0%**
Global seller	11.8%	43.5%	85	19%	14.1%	58.1%	121	19%	2.4%	14.6%**
Global purchaser	47.8%	11.9%	55	12%	56.5%	12.1%	65	10%	8.8%**	0.2%
Global supply chain	64.2%	68.2%	23	5%	70.8%	79.8%	38	6%	6.6%	11.6%*
Average	<b>13.9%</b>	<b>16.3%</b>	<b>456</b>	<b>100%</b>	<b>17.7%</b>	<b>22.4%</b>	<b>634</b>	<b>100%</b>	<b>3.8%**</b>	<b>6.1%**</b>

A Wilcoxon non-parametric test on the equality of averages was considered, since sourcing and distribution variables are not normally distributed

<sup>a</sup> Calculated as Sourcing in IMSS IV minus Sourcing in IMSS III, <sup>b</sup> Calculated as Distribution in IMSS IV minus Distribution in IMSS III

\*sig.<0.01, \*\*sig.<0.001

companies can be really considered as ones that cope with globalized supply chains. As previously noted, global distribution tends to be adopted slightly more often than global sourcing on average (Global Purchasers constitute between 10% (IMSS IV) and 12% (IMSS III) in the two samples; Global Sellers account for 19% of both samples). These results are true for both the IMSS III and IMSS IV samples.

#### 4.2 Longitudinal trend analysis

Even if the distribution of the sample appears to be similar in the different clusters in the different editions of the research, Table 1 allows identification of the overall shifts in supply chain strategy between the two editions. In order to understand the changes between the two samples, we compared the global sourcing and global distribution variables between similar clusters of the two different samples. On average, the adoption of both global sourcing and global distribution has increased between the two samples. This general trend is also reflected in the cluster centroids: Local Supply Chain companies increased the average adoption of both sourcing and distribution; Global Seller companies significantly increased the adoption of distribution only, indicating a growing adoption of this supply chain strategy. Similarly, Global Purchaser companies increased the adoption of sourcing. In the end, Global Supply Chain companies significantly increased global distribution, while the increase in global sourcing is not significant. This result is consistent with the overall result that shows a more relevant increment in the use of global distribution than in the use of global sourcing.

These results thus show that even if the clusters are confirmed in the two editions of the research, there has been a significant shift in the cluster centroids. Quite interestingly, the centroids of the unbalanced clusters (Global Seller and Global Purchaser) are not rebalancing but instead are confirming their global supply chain strategy.

These results demonstrate that changes have occurred between the two editions of the research. However, these changes could be explained by the fact that the two samples are not constituted of the same companies. In order to analyse the extent to which these results can be generalized, the strictly longitudinal sample has been considered. As previously indicated, this sub-sample constitutes 59 companies that participated in both editions of the research, allowing for direct comparison between the two editions. Comparing the strictly longitudinal sub-sample with the overall ones (see Electronic Appendix Table A.6), we notice that they do not differ significantly in terms of global sourcing, while global distribution is higher in both editions. We still argue that the sub-sample can at least partially strengthen the results of the overall sample, since it provides evidence of trends among a stable set of companies. In order to have a clear understanding of the trend, we performed a longitudinal analysis, considering the distribution of the sub-sample among the clusters and the fact that the changes occurred over time on global sourcing and global distribution (see Tables 2 and 3). This shows a significant amount of companies focusing mainly on their local supply chain and only two developing a real global supply chain (the distribution is similar to that found in the overall sample). In order to evaluate where companies have moved over time, we mapped each single company change between the two editions of the study: we considered the use of sourcing and distribution stable if for each company it has changed no more than 10%. The analysis described in Table 3 shows that several companies

**Table 2** Clusters distribution in the longitudinal sample

Cluster	IMSS III	IMSS IV
Local SC	29	29
Global seller	21	20
Global purchaser	7	3
Global SC	2	7
Total	<b>59</b>	<b>59</b>

**Table 3** Patterns of change of the companies between the two editions of the research

		Distribution			Total
		Decrease	Stable	Increase	
Sourcing	Decrease	2	5	1	<b>8</b>
	Stable	4	22	8	<b>34</b>
	Increase	2	3	12	<b>17</b>
	Total	<b>8</b>	<b>30</b>	<b>21</b>	<b>59</b>

have confirmed their use of the supply chain (22 companies are stable), and some have increased in both directions (12 companies). The chi-square test is significant (sig.<0.01), affirming the notion that the sample is not uniformly distributed.

Quite interestingly, changes in global supply chain strategies over time do not depend on the starting cluster based on the IMSS III data (Kruskal-Wallis sig. 0.204 for sourcing and 0.625 for distribution) but rather on the arriving cluster based on the IMSS IV data (Kruskal-Wallis sig. 0.001 for sourcing and 0.000 for distribution). This result suggests that over time companies have enhanced their mutual differences, resulting in the cluster centroids moving farther from each other. This seems to indicate that companies managing global supply chains, either inbound or outbound, are still significantly shifting their purchasing and selling activities globally, leading to a greater distance between companies based on local supply chains. In the end, all these results show that globalization of sourcing and distribution, even if it is on average increasing, is becoming a significant source of difference in companies' supply chain strategies.

#### 4.3 Global supply chain and global manufacturing

In order to investigate Research Question 3, we analyzed the influence of globalization and location of manufacturing on the global supply chain strategy. However, beforehand we checked for any significant effect that company size could have, since it is generally considered a critical factor in influencing global supply chain strategies. For the sake of simplicity and clarity, all statistical results here refer to the IMSS IV sample.

**Table 4** Globalization of production of the IMSS IV sample

		N	Mean	Sig.
Global sourcing	Local production	410	14,3%	0.000
	Global production	221	24,0%	
Global distr.	Local production	410	20,0%	0.000
	Global production	221	26,8%	

To perform the analysis of company size, we eliminated from the sample five companies that had fewer than ten employees and seven companies that had more than 5,000 employees, since these companies appeared to be outliers compared to the overall sample. Since the local size variable is not normal (Kolmogorov-Smirnov sig.=0.000), we performed a Kruskal-Wallis non-parametric test on size, which was significant (sig.=0.009), meaning that global supply chain strategy (i.e., cluster membership) is not independent from company size. In particular, Local Supply Chains are significantly smaller than Global Sellers (U-Mann Withney sig.<0.005), while there is no significant difference between Local Supply Chains and Global Supply Chains. In sum, in our sample, larger firms are more focused on global distribution, but not necessarily on globalization for the whole supply chain.

When considering the globalization of production (i.e., the fact that a company has manufacturing facilities in more than one region), companies were asked to provide information regarding whether they have only plants in one region (local production) or production is distributed in different countries around the world (global production). Results are shown in Tables 4 and 5.

We can observe that local producers tend to have local sourcing (U-Mann Withney sig. 0.000) and local distribution (U-Mann Withney sig. 0.000), and vice versa: global producers have a more globalized sourcing and distribution. The chi-square test for the cross-tabulation of the four clusters and globalization of production is significant (sig. 0.000), showing that there is a relationship between the two dimensions. In particular, the majority of local sourcers (Local Supply Chain and Global Seller) have local production, while global sourcers (Global Purchaser and Global Supply Chain) have global production.

Considering the location of the plant at which interviews were conducted, we show in Table 6 the distribution of the IMSS IV sample in terms of geographical regions and global supply chain clusters. The chi-square test is significant (sig. 0.000), leading to the rejection of the hypothesis of independence between the two dimensions.

We notice that North America has the highest concentration of Local Supply Chains, Europe has the highest

**Table 5** Globalization of production in the IMSS IV clusters

IMSS IV Cluster	Local production		Global production		Total	
	N	%	N	%	N	%
Local SC	288	70%	120	54%	<b>408</b>	<b>65%</b>
Global seller	77	19%	43	19%	<b>120</b>	<b>19%</b>
Global purchaser	28	7%	37	17%	<b>65</b>	<b>10%</b>
Global SC	17	4%	21	10%	<b>38</b>	<b>6%</b>
<b>Total</b>	<b>410</b>	<b>100%</b>	<b>221</b>	<b>100%</b>	<b>631</b>	<b>100%</b>

**Table 6** Location of the IMSS IV sample in the four clusters

Cluster	West Europe	East Europe & Middle East	North America	Oceania	South America	Total
Local supply chain	62%	58%	87%	67%	66%	<b>65%</b>
Global seller	24%	19%	5%	14%	10%	<b>19%</b>
Global purchaser	9%	6%	7%	12%	22%	<b>10%</b>
Global supply chain	4%	16%	0%	7%	1%	<b>6%</b>
Total (N)	<b>325</b>	<b>125</b>	<b>55</b>	<b>43</b>	<b>86</b>	<b>634</b>

portion of Global Sellers, South America the highest share of Global Purchasers, and finally East Europe & Middle East have the highest percentage of Global Supply Chains.

## 5 Discussion

RQ1. What are the global supply chain configurations adopted by manufacturing firms in terms of global sourcing and distribution?

On the basis of our results, we can now conclude that basically four possible strategies exist and are currently adopted by manufacturing firms. They are represented by four clusters, defined in terms of global vs. local sourcing and distribution. The first interesting result for both research and practice is the very high percentage (65%) of firms that still adopt a local supply chain strategy despite the emphasis given to the topic of globalization in the recent years. This fact can be interpreted in different ways: one could argue that the globalization process requires several years and that this percentage will decline in the near future. But in our data this percentage is stable over the considered time frame, with only a marginal increase in the level of globalization between the two editions of the research. A better explanation in our opinion is related to our definition of local supply chain: we consider local what takes place within the same region; therefore, an international supply chain within the same region is still local in our definition. This is coherent with the fact that most economic areas are today at the regional level (e.g., the European Union, NAFTA, the Mercosur, etc.). In sum, despite the strong impact of global players in the recent years, in the manufacturing sector, local (i.e., regional) supply chains still play a very important role. The challenge for both research and practice today is to understand whether such strategy is still competitive and sustainable or whether, instead, companies need to develop global supply chain capabilities in order to survive.

A second important question regarding these results is the possibility of adopting a global strategy for either sourcing only or distribution only, as well as for both. This suggests that different strategies exist and that their selection is a critical decision. Further analysis to better

understand which are the main drivers behind the choice of a particular strategy could be useful.

RQ2. How have global supply chain configurations changed in the last years?

In order to provide an answer to the second research question, we have compared the IMSS III and IV samples and analyzed the strictly longitudinal sub-sample. The first result is that the average level of globalization of both sourcing and distribution has increased, but to a limited extent only. This result appears to be in partial conflict with the general belief that globalization has increased dramatically in recent years, suggesting a more incremental trend.

Moreover, looking at the four strategies, they remained the same in the last 5 years, showing in each case an increase in globalization for the overall sample. Also, the percentages of firms adopting each of these strategies have remained quite stable, showing no dramatic change. The stability of the four strategies suggests that they are quite consolidated and that therefore companies choose a specific strategy and persist to adopt it over time.

The analysis of the evolution of the two “mono-directional” strategies, i.e., Global Sellers and Global Purchasers, shows that Global Sellers are further increasing the globalization of distribution and global purchasers the globalization of sourcing, strengthening the mono-directional focus of each strategy. This result suggests not only that these mono-directional strategies persist over time but that they even enforce their peculiar characteristics as well, appearing to be sustainable for firms.

The stability of the four strategies is true for sample distribution, but single companies do change their global supply chain strategies, as shown by the strictly longitudinal analysis. Indeed, we found this was true for single companies who changed the level of globalization of either sourcing or supply. We also found the same issue in companies that increased the level of globalization, as well as companies (a minority) that have decreased it. This heterogeneity within the sample suggests that there is not a “one best way” that all companies are following towards a higher level of globalization. On the contrary, there are different strategies, probably influenced by unsatisfying results achieved in the past.

RQ3. What is the impact of globalization and location of manufacturing on the adoption of global supply chain configurations?

In order to answer our third research question, we analyzed the relationship between global supply chain strategies and the globalization and location of manufacturing plants.

The first result shows that on average companies with a global manufacturing base have higher values of both global sourcing and global distribution, suggesting that a relationship among the three dimensions of the global supply chain does exist. Companies with a global manufacturing base in place are already operating on a global scale; therefore, it is more straightforward for them to manage sourcing and distribution globally as well.

However, in analyzing the relationship between the four global supply chain strategies and the globalization of manufacturing, we observed that the majority of companies buying locally also manufacture locally, while the majority of companies buying globally manufacture globally. This is not true for distribution. The finding suggests a stronger relationship between sourcing and manufacturing than the relationship between distribution and manufacturing. This is not a surprising result, since often companies with a global manufacturing base exploit suppliers on a global scale, while local manufacturers have more difficulties finding and managing suppliers from far away. On the other hand, distribution can be managed on a global scale without a global manufacturing base. Besides, plants overseas are frequently used because they are closer to foreign markets, with a strategy of local distribution.

Finally, in our sample we found different distributions of the four global supply chain configurations in the different regions. An interesting result is the fact that the highest concentration of global supply chains is in East Europe & Middle East, showing how manufacturing plants in this region often buy from far away to produce goods that are then distributed globally. This confirms the choice of this region as a manufacturing base serving other regions as well, Western Europe above all. On the other hand, we found the highest concentration of local supply chains in North America, suggesting that those firms who are still manufacturing in this region today tend to exploit the advantages of a local supply base to serve the local market.

## 6 Conclusions and further developments

This work provides an extensive analysis of globalization strategies in the supply chain based on two large databases of companies sampled in 2001 and 2005. Moreover, the results are strengthened by a longitudinal analysis of the companies that participated in both editions of the survey.

As a general trend, we found that globalization of sourcing and distribution is a growing but still not well diffused phenomenon and that companies tend to adopt the two strategies simultaneously, with a preference for global distribution. Looking more deeply, four clusters emerged in both editions of the survey (Local Supply Chain; Global Seller; Global Purchaser; Global Supply Chain), so it seems that companies are adopting four different configurations in terms of globalization of sourcing and distribution. We found that globalization is also becoming an issue for those companies that are not globalized (i.e., Local Supply Chain is increasing both global sourcing and distribution) and that the unbalanced clusters (Global Seller and Global Purchaser) are confirming their global supply chain strategy. Finally, we found that, on average, companies with a global manufacturing base rely more on global sourcing and global distribution.

These results improve significantly on existing research, as there are few contributions on globalization trends based on large samples and supported by longitudinal analyses. The literature lacks studies about globalization in a full supply chain perspective. In fact, as globalization of sourcing, manufacturing and distribution are related, it is important to attain a high-level and integrated point of view.

On the other side, practitioners may find it useful to understand that globalization is a growing trend and is not mono-directional. There are differences in implementing supply chain strategies according to company characteristics (e.g., country of origin, manufacturing globalization) and issues of path dependency. For example, Global Seller and Global Purchaser are behaving differently, with some companies even reducing their level of globalization, as the longitudinal analysis has shown. We claim that this result is important from a managerial perspective because it states that there can be different configurations; thus, there is no “one best way” according to which companies should manage their supply chain globally.

Contingency analyses arise showing that there are several issues that companies willing to globalize their supply chain should consider and that firm size is not so important in determining the globalization strategy. This is interesting for small and local companies’ managers, since it demonstrates that these companies can actually increase their globalization level to gain some competitive advantage.

The limitations on this work are related in part to the sample and in part to its exploratory nature. Despite the IMSS database provides a richness of data which has few equals in the Operations Management research community, still the world coverage is not complete, in particular the IMSS III sample included fewer countries compared to IMSS IV. Besides, the number of firms in each country is also limited, although interesting observations can be made



all the same. Anyway, all the findings can gain greater insight through further analysis. First, it would be interesting to link globalization strategies to business strategies in order to understand why companies adopt certain types of supply chain configuration and to see which kind of competitive advantage they look for. Moreover, it would be useful to link operational and business performances to this model, so that which strategies perform better under which conditions could be learned. Next, a geographical analysis of where companies purchase, manufacture and distribute could provide interesting insights for practitioners when deciding where to globalize. Finally, more contingencies such as product type, socio-economical country variables and industry type could be considered to complete the picture.

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