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# An Exploratory Study of Differences in Manufacturing Strategy between National and Global Production Firms

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## Abstract

The purpose of this paper is to explore differences of the manufacturing strategy between plants that produce in a global manufacturing network and such plants that are part of local production only. Both groups of firms serve a worldwide market. As methodology, the paper uses statistical analyses, in particular difference and correlation tests, which are based on data from the fourth round of the International Manufacturing Strategy Survey (IMSS). Major findings are that the two groups of plants differ concerning their order winners, capabilities and performance. Both types of plants exist in substantial quantities within the sample. Based on these results, the paper puts forward a detailed research agenda of manufacturing strategies in international contexts.

**Keywords:** Manufacturing strategy, Globalization, Off-shoring, Exploratory study

## 1. Introduction

Potential advantages of global production are manifold: cost savings, access to local markets, easier adaptation to different cultures, global branding, and acquisition of knowledge. However, this study shows that within a large international sample of manufacturing firms from specific industries more companies choose to produce in only one country than companies that decide for global production—even though both groups claim to compete internationally. This article explores what differentiates the two groups of companies in terms of the constituents of manufacturing strategy on the plant level: order winning criteria, strategic priorities and capabilities within manufacturing, and operations' performance.

This exploratory comparison is relevant because it can be assumed that the degree of internationalization of production within a company and the manufacturing strategy pursued at the plant level are interrelated. In this sense, one can expect differences between plants that are part of an international production network and plants that are nationally producing goods. However, what exactly the nature of this difference is has not been investigated in the literature. Thus, the purpose of this paper is to identify and discuss differences in manufacturing strategy of global and national production firms.

The paper is structured as follows. In the next section, the literature is reviewed that deals with the internationalization of manufacturing. In the section thereafter, it is explained why manufacturing strategies are worthwhile to investigate with the perspective of global versus national production. In the fourth section, the methods used in the statistical analyses are presented together with the empirical sample that is used as a database. The results of the analyses are provided in section five. In the section after that, the results are discussed and implications for managing manufacturing companies are considered. The paper closes with an exposition of issues for further research, which is derived from the exploratory investigation.

## 2. Literature Review: Manufacturing on a Global Scale

The general strategy literature discusses globalization from a variety of perspectives. The overall—not surprising—result of these discussions is that a global strategy is required when relevant interdependencies exist between the competitive positions of firms in different countries and continents (Porter, 1980; Hout et al., 1982; Porter, 1986; Prahalad & Doz, 1987; Ohmae, 1990). Mostly, studies in the field of international management argue from a market-based perspective of strategy, i.e. they focus on aspects external to the company. However, some attempts have been made to take a resource-based, internal perspective on the merits of becoming global (Collis, 1991; Carr, 1993), which links more directly to the field of manufacturing strategy and operations management.

Although some doubts have been raised whether a field called “International Operations Management (IOM)” is necessary in principle (e.g., Whybark, 1997), this study follows Ghemawat’s (2003) notion that manufacturing firms experience a “semi-global” environment. Most companies operate neither in a truly global environment without geographical or cultural borders and differences, nor can they function in isolation without any influences from extraterritorial factors. Because of the semi-global environment, additional strategic issues from the international aspects of business exist that need to be considered by manufacturing strategists.

Studies in IOM often focus on co-ordination issues of existing plants, location decisions, or specifics of outsourcing decisions (e.g., Mol et al., 2005; Henisz & Delios, 2001; Pennings & Sleuwaegen, 2000; Arnold, 2000; Hoffman & Schniederjans, 1994; Porter, 1990); only rarely, total manufacturing network configurations are considered (Meijboom & Vos, 1997). This article aims at addressing a combination of two major research areas identified by Roth et al. (1997; see also Prasad & Babbar, 2000): ‘strategic issues’ and ‘location and facilities’. Thus, this study investigates which manufacturing strategies are followed either when firms decide to produce locally (in the sense of producing just in their home country) for a global market, or when they decide to install production facilities globally.

According to the Upsalla Internationalization Model (Johanson & Wiedersheim-Paul, 1975; Johanson & Vahlne, 1990), the firms in these two groups would be in two different stages of their internationalization process. Firms that produce locally and sell globally are on stages 2 or 3 of this model, meaning exporting through either independent or dependent sales organisations in different countries (stage 1 symbolizes no exporting activities at all). Firms that produce and sell globally would be on stage 4 of this model, which is exactly defined as this combination of global production and sales activities. According to this model, over time companies would move from stage 2 to stage 4; thus, firms that are local producers today would eventually become global producers. A similarly staged approach is proposed by Innovation-Related Internationalization Models, although with a different conceptual background than the Upsalla Model (see Andersen, 1993, for a review).

There is further theoretical, anecdotal and empirical evidence that internationalization can be beneficial for manufacturing firms (Buckley & Casson, 1976; Ohmae, 1985; Henisz, 2003; Doukas & Lang, 2003). Various factors are considered important when making the decision to internationalize manufacturing (DuBois et al., 1993; MacCarthy & Atthirawong, 2003). Cost savings appear to be the most commonly assumed effects; nevertheless, the importance of such savings has been doubted (Ferdows, 1997a; Vereecke & de Meyer, 2006; Pitelis & Verbeke, 2007). Ferdows (1997b) identifies two other major reasons for the set-up of factories in different countries: market proximity and access to technological expertise. Bartlett et al. (2004) distinguish three ways how firms can benefit from becoming international: exploiting cross-national differences in sourcing and market potential, exploiting economies of scale, and exploiting economies of scope. Nevertheless, the question remains, why even within a group of companies with related products and/or markets, some companies produce internationally, while others do not, and what differentiates these two types of companies with regard to their internal structure and strategies. In this sense, this paper addresses Prasad et al.’s (2001, 660) question, “what are the differences in international operations strategies employed by similar [...] organizations [...]?”

Dunning (1980) provides a well-known and general attempt to conceptualise bundles of criteria that lead companies to internationalise their production: the OLI concept (Ownership-Location-Internalization). In his “eclectic theory” of international production, he claims that foreign direct investments of firms depend (i) on the ownership of certain resources, (ii) on the availability of certain resources at specific locations, and (iii) on the benefits of internalizing these resources. Although rather comprehensive, the theory does only implicitly shed light on the question, what the differences are in terms of the manufacturing strategy employed between companies going or not going international. This paper describes such differences based on concepts from current discussions in the manufacturing strategy literature: strategic resources, strategic priorities and capabilities, and operations’ performance indicators. Thus, it concentrates on an internal perspective of organisations, since there seem to lie the greatest issues concerning globalization (Bartlett & Ghoshal, 1987). In contrast, issues of global supply chain configurations (Cagliano et al., 2008; Ettl & Sethuraman, 2002; Levy, 1995) or global purchasing and sourcing (Leonidou, 1999; Murray et al., 1995; Kotabe & Swan, 1994; Ellram, 1991; Kotabe, 1990; Arnold, 1989) are discussed elsewhere.

As far as methodology is concerned, there have been case studies (e.g., DuBois et al., 1993), a Delphi study (MacCarthy & Atthirawong, 2003) and formal models (e.g., Flaherty & Raubitschek, 1990) addressing the question, why some manufacturing firms produce on a global scale, while others do not (and, for instance, choose for exporting their product offerings). This question has been discussed under the label “market entry mode” in the literature (Anderson & Gatignol, 1986; Kim & Hwang, 1992; Agarwal & Ramaswami, 1992). The issue is non-trivial because apparently both types of companies can be successful internationally. To shed some further light on this issue, Kalfadellis & Gray (2002) call for

survey based research of managerial perceptions as in this paper. Meijboom & Vos (1997) ask for dynamic analyses due to the importance of the timing of the internationalization decision (Prasad et al., 2001, ask for investigating “time lags”; for a conceptual discussion of different stages see Anderson et al., 1998; for a first simulation attempt using complex adaptive systems see Slepniov & Wachrens, 2008).

### 3. Research Design: Manufacturing Strategy and the Globalization Decision

Since no well-elaborated theory on the manufacturing strategy component of the internationalization decision exists, this study is not testing a theory but collecting exploratory evidence to formulate such a theory. While following an internal perspective, the general necessity to reconcile organisational assets with external competitive factors is not doubted. Rather, the paper focuses on that part of the “story” that is regularly not in the centre of the discussion: it investigates and cautiously interprets differences between national and global manufacturing firms concerning their manufacturing strategy. There is no claim made that firms manufacture globally because of the manufacturing strategy they pursue. Frequently, the motivation and the reasons for going global might be external pressures or issues of the size or supply chain organisation of the firms (as formulated in the ‘eclectic model’; Dunning, 1980), with manufacturing strategy only being a resultant of these factors. Nevertheless, it appears relevant to know about differences in manufacturing strategy, since the comparison provides information about what operations actually does in manufacturing firms.

To elaborate on this last point, the decision to produce globally is mostly not driven by manufacturing strategy; rather manufacturing strategy is shaped by this decision, in particular on the level of individual plants. Thus, a strong effect can be supposed from the globalization decision to the actual manufacturing strategies pursued in the plants of a company. One reason for this is that the decision to globalize is taken on a corporate level while the manufacturing strategy has a strong plant-level manifestation (for a discussion of different strategy levels, see Gupta & Lonial, 1998). The question therefore is how manufacturing strategies subsequently differ between plants being part of a national production company and plants being part of a global production network. From this starting point, related questions result, like, why differences can be observed, and how these differences can be interpreted. From an international management point of view, the interest in the answers to these questions lies in the fact that manufacturing strategies are an artefact of the reasons that initially have determined the globalization decision, i.e. they reflect the original intentions.

In contrast to this, the effect of manufacturing strategy on the globalization decision is rather weak, since mostly strategic issues outside the realm of manufacturing are being considered crucial when making the decision to globalize production. However, an influence from manufacturing strategy cannot completely be ignored, for instance when a well-articulated manufacturing strategy on the corporate level exists or when an existing off-shore plant is bought just because of its manufacturing strategy.

While these effects might occur only occasionally, it appears justified to claim that the success of globalization decisions depend—at least to a substantial share—on the manufacturing strategy that affected plants pursue. In the same way, a manufacturing strategy for a plant can only be successful when it corresponds to the globalization decision. Figure 1 reiterates the linkages between the decision to globalize production and manufacturing strategy on the plant level.

<Figure 1 about here>

In summary, the manufacturing strategy of a plant shows the concrete effects of the decision to go global on the operations function and is of crucial importance to operations and production management as such. Thus, in the study differences in the manufacturing strategies of ‘national’ versus ‘global’ producers are compared.

Figure 2 depicts the research design of this study and what is understood when the term ‘manufacturing strategy’ is used. In an eclectic way, the following constructs are considered to represent manufacturing strategy: order winning criteria (Corbett & Van Wassenhove, 1993; Hill, 2000), strategic priorities and capabilities within manufacturing (Ward et al., 1998; Boyer & Lewis, 2002; Flynn & Flynn, 2004; Größler & Grübner, 2006), and operations’ performance (De Toni & Tonchia, 2001; Devaraj et al., 2004; Laugen et al., 2005). All constructs were operationalized in a well-tested questionnaire survey, as explained in the following section.

<Figure 2 about here>

### 4. Methodology and Data Sample: International Manufacturing Strategy Survey

Empirical data is drawn from the fourth iteration of the International Manufacturing Strategy Survey (IMSS-4), which took place in 2005/2006 (Taylor & Webster, 2006). In this international survey project, manufacturing plants from ISIC codes 28–35 are examined. These plants manufacture metal products, machinery, electrical devices, transportation equipment, and measuring and controlling equipment. More specifically, the directors of operations are asked since they appear to be the persons competent enough to answer the questions from the many domains of the participating plants

that are covered in the questionnaire. Since in IMSS the level of analysis is the plant, manufacturing strategies of plants are compared in this study. Thus, it is examined how the decision to produce globally or nationally is reflected in the plants' strategy.

The following exploratory investigations are based on the collected data of 711 plants from 23 different countries. The response rate over all participating countries was about 30 %; sampling method was convenience sampling with some random participants. In order to enhance comparability within the study, 71 plants were omitted from the original IMSS-4 sample: plants with a substantial amount of missing values and plants with less than 100 employees have been excluded from further consideration, leaving 640 plants for the subsequent analysis. The table in Appendix A gives an indication of sample composition concerning industry and country affiliation of firms.

One goal of the IMSS project is to establish a longitudinal database of participating plants in order to study the dynamics of plant development. Therefore, the sample has been held constant as far as possible, which means that it has been tried to retain plants from previous rounds. However, because it was not possible to retain enough companies from earlier rounds (due to companies ceasing to exist, new corporate structures, or unwillingness to participate again), the IMSS-4 sample has been completed by random selection with a purposeful bias towards well performing plants. Because of this sampling strategy (preferring plants that have survived over some years or that are perceived as well performing), an overall bias towards high-achieving plants might be possible. Filling-out of the questionnaire took place in the participating companies, without influence of the researchers (self-administered study); questionnaires were sent out by mail, email or fax, frequently after establishing contact by telephone. Most questionnaire items are in the form of perceptual measures (Ketokivi & Schroeder, 2004). For instance, respondents are asked to rate the internationality of competition on a five-point Likert scale.

Statistical methods used in this article are rather straightforward. In the beginning, plants are classified according to their degree of internationalization of manufacturing and competition. Later on, firms that claim to compete globally are further distinguished into those that appear to produce only locally (in their respective country) and those that produce globally. Differences between these two groups are explored with the help of t-tests.

## **5. Results of Exploratory Analyses: Group Composition and Group Differences**

In the beginning of the analysis, for all companies of the IMSS sample the level of international production (using questionnaire item A3; all items can be found in Appendix B) and global sales (using item SC10c) have been put into relation (for a similar approach see Flaherty, 1996, chapter 1). A correlation analysis of the questionnaire values reveals a significant positive correlation between the two variables (A3 and SC10c). However, the effect size is rather small (Spearman's correlation coefficient,  $\rho=0.08$ ). So, at most, a weak tendency towards the "global competitor with global production" model can be stated.

In order to achieve clearer results, the companies in the sample were classified. Firms that reported to produce only at one site or only in the country of origin are considered "national manufacturers"; firms that produce in various countries in more than one continent are considered "global manufacturers". This approach excludes those companies that report to produce in a few countries but only in one continent. Thus, effects of economic regions spanning over continents (like the European Union) are prevented from having an impact on the analysis. Further, this procedure increases the assumed differences between the two groups of companies, supposedly resulting in more and stronger outcomes of the statistical analyses. Forty-seven companies are kept out by this procedure.

For the geographical scale of competition, a questionnaire item is used that asks for the percentage of sales in the domestic market, in the same continent, and in different continents. Firms that only compete in the domestic market are named "national competitors"; firms responding with a share of more than 25 % of their sales as going to different continents are called "global competitors". While this 25 % limit is arbitrary (Cavusgil, 1982, uses for a somehow similar limit a 10 % hurdle), it guarantees a substantial and frequent globalization of sales activities, which is an important factor in this study: only in very special cases will companies globalize their production, when they compete on a local market only. As with the scope of manufacturing, this approach excludes companies that are international to a certain degree (by selling to other countries in the same continent), but that are not truly global, i.e. having no or only a marginal share of sales in other continents (397 companies). After this classification, 232 firms remain in the database.

The classification employed here does not differentiate between a "multi-domestic" and a "global" orientation between companies in the sense of Shi & Gregory (1998, p.203), since the data gives no indication whether a truly global strategy is followed or whether production and sales are "just" spread over many geographical regions. However, considering the other dimension in Shi and Gregory's framework, it can be stated that in this study "worldwide" and "multinational" plant dispersions are compared to "domestic" ones.

In the reduced IMSS sample, more than 1/3 of companies are classified as “global manufacturers”; approximately 3/4 of companies are categorised as “global competitors”. Table 1 shows the number of manufacturing plants in the resulting four groups: while the ratio between national manufacturers and global manufacturers is approximately 4:3 for global competitors, it is 5:1 for national competitors.

Table 1 shows that the biggest amount of firms falls into the “national manufacturer/global competitor” category (called “inside-out”, which can be thought of as globally exporting firms). The “distributed” group (global production and sales networks) comprises approximately the double number of firms as the “focused” group (firms restricted to their local market and production facilities). Only a small number of companies are classified as “outside-in”, meaning they produce globally, but compete on a national market only (probably having off-shored parts of their production for cost reasons, but not competing in other markets).

<Table 1 about here>

For the rest of the paper, only global competitors are considered (183 firms in total) because this is in accordance to the initial question, what differentiates companies that produce globally and such that do not in terms of manufacturing strategy, while both groups compete on a global level. Thus, in the following only the “distributed” (76 firms) and the “inside-out” group (107 firms) are compared. By leaving out the “national competitors”, this study does not address the question whether firms should compete globally and whether a strong domestic position is supportive or inhibiting in this process (Porter, 1990; Baden-Fuller & Stopford, 1991).

The first comparison (shown in Table 2) regards the environment in which these firms compete. T-tests on questionnaire items A4a to A4g show that “distributed” firms and the “inside-out” group do not differ a lot with respect to external factors. Significant differences can only be found for the geographical focus these firms have (item A4d): although both groups of companies compete globally, the group that manufactures globally reports a significantly higher level of internationalization concerning their environment than the firms that manufacture nationally. This questionnaire item asks in a general way about the geographical focus of a firm’s business and is related to its overall activities, including manufacturing. In summary, firms in the “distributed” group seem to experience a more competitive environment than do firms in the “inside-out” group. However, with the exception reported, this finding is not statistically significant.

<Table 2 about here>

The next comparison deals with differences in performance between the two groups of firms. In Table 3, financial (item A6) as well as manufacturing related (item B10) performance scores from the IMSS questionnaire are compared. For reasons of simplicity, only significant differences are reported. Concerning financial measures, companies with global manufacturing report higher performance scores than national manufacturers. This finding holds for absolute measures (sales revenue) as well as for relative measures (sales revenue, return on sales, and return on investment as compared to the major competitors of the firms). However, for sales revenue, this result can be an effect of the classification method, since the “inside-out” group comprise companies that consist of one plant only as compared to the “distributed” group, where the company necessarily consists of a network of plants (within different continents). It can be expected that firms with many plants most of the times have a higher sales volume than companies that have just one plant, i.e. the size of the company does matter in this respect. Thus, while the difference in absolute performance figures like sales revenue is rather intuitive, it has not been obvious beforehand that “distributed” firms are also doing slightly better in relative terms.

The relationship is just the opposite for one performance measure closer to manufacturing: throughput time efficiency is higher for the “inside-out” group than for the “distributed” group. All other manufacturing performance scores measured in IMSS do not show significant differences and are not consistent in the direction of differences.

<Table 3 about here>

In Table 4, differences concerning the current order winning criteria of the firms are displayed (item A5; Hill, 2000). Five of in total eleven sub-items in the IMSS questionnaire show significant differences. Except for the order winner “product design and quality”, global manufacturers put more emphasis on all other order winners. Design and quality, however, is more important to “inside-out” producers.

<Table 4 about here>

The following analysis (Table 5) shows other constituents of manufacturing strategy. On the one hand, the change in importance of strategic priorities defined by the companies is compared (item B4). On the other hand, the intensities of strategic capabilities possessed by the firms are investigated (item B9). Thus, the analysis relates to the future and the current strategic assets with which the manufacturing function supports how companies compete in their markets (for a

more detailed discussion about the differences between strategic priorities and strategic capabilities, see Größler & Grübner, 2006; Ward et al., 1996; Roth, 1996).

<Table 5 about here>

There is only one significant result for strategic priorities (“reducing time to market”): the “distributed” group identifies a shorter time to market as a stronger strategic priority. The two significant results for strategic capabilities do not indicate consistent differences between the groups. While the product customization ability has grown stronger in the “distributed” group than in the “inside-out” group, capacity utilization has improved stronger in the “inside-out” group than in the “distributed” group.

Some further analyses show that the “distributed” group involves suppliers significantly more in product development than the “inside-out” group (t-value 2.44,  $p < 0.05$ ), but that the contrary is true for the involvement of customers (t-value 1.79,  $p < 0.1$ ; item PD4). In addition, firms with global production have a significantly higher number of customers (on average 2740 compared to 440; these values become rather equal when normalized for the size of the company as represented by sales revenue; see Table 3). However, global producers consider only a smaller number (on average 31 compared to 42) as strategic customers, compared to national manufacturers (item SC5).

## 6. Discussion and Practical Implications: Different Paths to Success

As a result from the classification of companies can be stated that firms are able to compete globally, even when they have only national manufacturing. This finding is against a possibly naïve assumption that manufacturing should follow sales in its internationalization endeavours. However, the usefulness of going global with manufacturing depends presumably on the complexity of the products offered and the maturity of products. For instance, Sweeney (1994) describes that national producers could outsource substantial modules of their products to low-cost countries. This effect would bias the results of this analysis since such companies would appear as “inside-out” producers, when in fact only a small part of the value creation process is done locally. Although IMSS is not designed to detect differences between product characteristics that are below the ISIC level of classification, no statistical difference could be found between the two groups concerning the number and importance of suppliers. The difference that has been found (higher involvement of suppliers in product development for the “distributed” group) works contrary to the assumption that national producers “just” buy substantial parts of their product. In fact, suppliers are more involved for the global manufacturing group indicating a stronger linkage between them and their suppliers, as between national producers and their suppliers.

Global manufacturing firms experience a more intense environment than national manufacturers. However, the question cannot be answered with cross-sectional studies whether going global is a reaction on stronger competition or whether global manufacturing causes an increase in competition. Thus, the proverbial question after cause and effect is represented in the statistical results. The same holds for the differences in company size (based on sales revenue): it is not clear whether bigger firms (in terms of sales; see Table 3) more often decide to manufacture global, or whether firms that decide to manufacture globally become bigger.

Global manufacturers achieve better financial performance than national manufacturers, which is not true for manufacturing performance scores (see Table 3). For production throughput time, national manufacturers are better. When following a purely plant-focussed interpretation of the related questionnaire item (i.e. as percentage of real working time from first to last operation), this result probably can be interpreted in a way that local producers are more focussed, using their capacity to a higher degree. For a wider interpretation of total manufacturing lead time (from order reception to delivery), this result possibly can be interpreted by the fact that—when manufacturing sites are located in one country—transportation times during the production process are potentially shorter, than when production is distributed over continents. Thus, throughput time efficiency can be expected to be better for national producers in this case.

The manufacturing strategies of the two groups—represented in the strategic priorities and strategic capabilities of the firms—are not substantially different. The one difference for strategic priorities (“reducing time to market”) can be loosely linked to the finding that throughput time efficiency is worse for global than for national manufacturers. A possible interpretation for this result would be that global manufacturers want to outweigh necessary under-performance concerning throughput time by being fast in bringing new products to the market (see Table 5).

The most pronounced differences between the two groups are to be found regarding the order winning criteria. The statistical analysis of the corresponding questionnaire items reveals why national manufacturers can be successful in global competition without producing globally: they simply offer products with superior quality and design. All other competitive factors presumably become of lower relevance, as long as products are excellent (and no other firms are

able to produce the same quality products with additional benefits, like lower cost, or better after-sales service). While one could argue that for the industries in the sample (e.g., machinery and instrumentation), a high-quality strategy with strong local controls might make sense and is quite common, it is remarkable that it is obviously not the case for all companies in these industries. It is unclear at this point if in other industries internationalization decisions are made more consistently, i.e. whether in other industries a majority of companies go global (or stay local) when they compete globally. For instance, for high-volume consumer products it might be crucial to have a production site in the proximity of their worldwide markets, in order to reduce outbound transportation times.

The concentration of the “inside-out” group on product quality and design can be loosely connected to Simon’s concept of what he calls ‘hidden champions’ (Simon, 1992; Simon, 2007; cf. also Fillis, 2001). In this view, ‘hidden champions’ are small or medium sized firms that are world market leaders, but—despite their success in the market place—are not widely known to the public (because they usually serve specialist markets for industry goods). Simon found out that these companies name product quality as the single most important factor for their success. ‘Hidden champions’ usually refrain from spreading their production and from outsourcing (for example, because of the availability of specific knowledge in their home region, the fear for infringements of their intellectual property, or the direct access of headquarters to production facilities). Although from the IMSS database it is unclear whether “inside-out” firms are market leaders, this group seems to follow at least a similar strategy as ‘hidden champion’ companies.

Strategically, a problem connected with the concentration on product quality is the dependence on the status quo. In other words, firms following this strategy need to be aware that the competitive setting might change and they should be willing to innovate and keep their product up-to-date, thus applying a dynamic perspective on product strategy. In contrast, when firms produce globally, they win orders on a few criteria other than product quality and design: product range, service, frequency of new products, and product innovation (see Table 4). Again, it is not clear from the analyses if this is a prerequisite of being global or if global production is a strategic move to become able to offer these order winners. However, Bartlett & Ghoshal (1987) suggest that having multidimensional strategic capabilities is a need for globally acting companies.

The substantial differences in manufacturing strategy between the two groups of firms is an indication against a strict understanding of phased models of internationalization (Anderson, 1993) that suggest that companies naturally move along pre-defined stages in their degree of globalization. Although a longitudinal panel analysis would be necessary to determine ultimately the validity of these models for the industries investigated in this paper, it appears unlikely that plants are able to change their manufacturing strategy completely when moving from one to the other stage.

In summary, the statistical tests provide exploratory results for the differences in the manufacturing strategies of global and national producers. Consequently, there is no general clear-cut recommendation for firms, when they have to decide on the question, whether to manufacture globally or not and what manufacturing strategy to employ in either case. Besides the fact that in strategy general solutions (“one size fits all”) should be treated with caution anyhow (Barabba et al., 2002), the analyses show that both types of firms can be successful (with only marginal, but significant benefits for global manufacturers). In addition, the results suggest that, when a firm manufactures a product that is unrivalled in its quality and/or design, it might be preferable for such a company to concentrate manufacturing on its home “turf”, thus, producing where they are familiar with culture, worker attitudes, education, and skills, and with legislation and taxation regulations. Following this line of reasoning, going global with manufacturing might be a reaction of companies that do not possess such a superior product: in this case, they have to compete on price, on service, and on innovation, which might be triggered and supported by producing in different markets and cultures. Cautiously interpreting the differences in performance between the two groups of companies, the globalisation strategy seems to pay off for the “distributed” group.

## 7. Further Research: Theory Building and Testing

This study is exploratory in the sense that it does not test hypotheses about prevalent reasons for becoming a global or a national producer. Rather, this paper uses a big international database of manufacturing plants to explore some conceivable differences between the groups, with an emphasis on the manufacturing strategy pursued by the firms. By this means, the paper contributes to developing and eventually formulating a theory about globalizing production. A research agenda supporting this process of theory building and testing should comprise:

- the formulation of testable hypotheses, based on further analyses of IMSS data and on other databases, why some firms decide to produce globally, while others stay national with their production, when both types of firms compete on a global scale;
- the inclusion of information about other forms of vertical and horizontal integration, which are not tested in IMSS and which might have an effect on the globalization decision (for instance, the production in geographical in



clusters; Nassembini, 2003);

- a further investigation of the dependency on industry factors and product characteristics like complexity and maturity (Sweeney, 1994);
- studying the role of changing economic conditions around the globe (for instance, higher average wages in former “low-cost” countries, costs of transportation; Goel *et al.*, 2008);
- longitudinal research (for instance, over all IMSS rounds that have been conducted so far), in order to shed some light on the various cause and effect problems identified in this paper and in particular on changes in the manufacturing strategy when going global (De Toni *et al.*, 1992; Andersen, 1993);
- a differential investigation of manufacturing companies going global from industrialized countries as compared to firms originating in developing countries and globalizing from there (Fleury & Fleury, 2008);
- a differential investigation of the manufacturing strategies of factories serving specific roles in a manufacturing network (Shi & Gregory, 1998; Vereecke & Van Dierdonck, 2002; Vereecke *et al.*, 2006; Vereecke *et al.*, 2008);
- the causal mapping of factors and effects could contribute to a more comprehensive understanding of the globalization process;
- the formulation of dynamic models of going global can help investigating timing effects in this process, which are supposed to be crucial (Meijboom & Vos, 1997; for a conceptual attempt see Johanson & Vahlne, 1990).

One of the most pressing issues on the methodological side seems to be the inclusion of the notion of feedback. By utilizing longitudinal research designs and the formulation of formal models that explicitly take into account feedback relationships, questions can be investigated, like whether global manufacturers react to an intensified competition or whether they themselves create a more hostile environment by their move to global production.

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**Appendix A.** IMSS-4 sample composition (ten companies did not report on industry and are therefore not included in the table)

Country	ISIC Code Rev. 3.1								Total
	28 (fabricated metal products)	29 (machinery & equipment)	30 (office & automation machinery)	31 (electrical machinery)	32 (radio, TV, communication equipment)	33 (medical & optical instruments)	34 (motor vehicles & trailers)	35 (transport equipment)	
Argentina	24	6	1	5	1	1	5	1	44
Australia	3	2	0	0	0	0	0	0	5
Belgium	15	4	0	4	3	0	1	3	30
Brazil	5	3	0	0	1	0	5	1	15
Canada	12	6	0	1	1	0	3	1	24
China	7	9	2	12	2	0	3	0	35
Denmark	10	8	1	6	2	4	0	1	32
Estonia	6	3	3	6	1	0	0	0	19
Germany	6	2	0	4	1	2	0	1	16
Greece	5	1	0	1	1	0	0	0	8
Hungary	22	9	0	4	6	1	9	3	54
Ireland	2	2	0	4	3	2	0	0	13
Israel	7	1	1	1	1	0	0	0	11
Italy	8	19	0	4	7	1	2	4	45
New Zealand	7	8	0	4	0	0	0	1	20
Norway	10	1	0	2	0	1	1	0	15
Portugal	6	1	0	1	0	0	1	0	9
Sweden	24	20	0	9	4	4	12	5	78
The Netherlands	18	11	4	13	0	5	3	5	59
Turkey	5	12	0	2	1	0	9	5	34
United Kingdom	5	1	0	3	0	0	1	1	11
USA	13	0	3	1	1	2	4	7	31
Venezuela	14	0	0	2	0	0	6	0	22
<b>Total</b>	<b>234</b>	<b>129</b>	<b>15</b>	<b>89</b>	<b>36</b>	<b>23</b>	<b>65</b>	<b>39</b>	<b>630</b>

**Appendix B.** Original items from IMSS-4 questionnaire used in this study

A3. Which best describes your business unit's situation relating to manufacturing?

At one site in this country      At more than one site in this country      At sites in a few countries in this continent\*      Globally, at sites in various continents

Where are the business unit's products produced?                       

SC10. Regarding location of your sales activity, indicate the approximate split of sales according to the following (your answers should add up to 100%):

Sales activity

a) This country \_\_\_\_\_ %

b) Within your continent\* \_\_\_\_\_ %

c) Outside your continent\* \_\_\_\_\_ %

**100 %**

A4. How would you describe the external environment?

a) Market dynamics	<b>Declining rapidly</b>	1	2	3	4	5	<b>Growing rapidly</b>
b) Market span	<b>Few segments</b>	1	2	3	4	5	<b>Many segments</b>
c) Product focus	<b>Physical attributes</b>	1	2	3	4	5	<b>Service emphasis</b>
d) Geographical focus	<b>National</b>	1	2	3	4	5	<b>International</b>
e) Competition intensity	<b>Low intensity</b>	1	2	3	4	5	<b>High intensity</b>
f) Market concentration	<b>Few competitors</b>	1	2	3	4	5	<b>Many competitors</b>
g) Market entry	<b>Closed to new players</b>	1	2	3	4	5	<b>Open to new players</b>

A6. What is the current business unit performance? For market share indicate average in market(s) served by business unit products. How do you perform relative to three years ago and to main competitor(s)\*?

	Current figure (2004)	Compared to three years ago the indicator has					Relative to our main competitor(s), our performance is				
		deteriorated more than 10%	stayed about the same	improved 10%-30%	improved 30%-50%	improved more than 50%	much worse	equal	much better		
										1	2
Sales	€	1	2	3	4	5	1	2	3	4	5
Market share	%	1	2	3	4	5	1	2	3	4	5
Return on sales (ROS)	%	1	2	3	4	5	1	2	3	4	5
Return on investment (ROI)	%	1	2	3	4	5	1	2	3	4	5

1 ROS = Earnings before interests and taxes/Sales    2 ROI = Earnings before interests and taxes/Total Assets

B10. What is the current performance level on the following dimensions?

- Throughput Time Efficiency (defined as the time the products are worked on as a % of the total manufacturing lead time – i.e. start of first operation to finish of last operation)? \_\_\_\_\_%
- Late deliveries to customers (as percentage of orders delivered)? \_\_\_\_\_%
- Scrap and rework costs (as percentage of sales) \_\_\_\_\_%
- Customer complaints (as percentage of orders delivered) \_\_\_\_\_%

A5. Consider the importance of the following attributes to win orders from your major customers.

	Current importance					Over the last 3 years the goal has				
	Not important		Very important			become less important	stayed the same	become more important		
lower <b>selling prices</b>	1	2	3	4	5	1	2	3	4	5
superior <b>product design and quality</b>	1	2	3	4	5	1	2	3	4	5
superior <b>conformance quality</b>	1	2	3	4	5	1	2	3	4	5
more <b>dependable deliveries</b>	1	2	3	4	5	1	2	3	4	5
<b>faster deliveries</b>	1	2	3	4	5	1	2	3	4	5
superior <b>customer service</b> (after-sales and/or technical support)	1	2	3	4	5	1	2	3	4	5
wider <b>product range</b>	1	2	3	4	5	1	2	3	4	5
offer <b>new products more frequently</b>	1	2	3	4	5	1	2	3	4	5
offer <b>more innovative products</b>	1	2	3	4	5	1	2	3	4	5
greater <b>order size flexibility</b>	1	2	3	4	5	1	2	3	4	5
<b>environmentally sound products</b>	1	2	3	4	5	1	2	3	4	5

B4. How important are the following improvement goals for your manufacturing function for the next 3 years?

	Not important			Very important		
Improving <b>manufacturing conformance</b>	1	2	3	4	5	
Improving <b>product quality and reliability</b>	1	2	3	4	5	
Increasing <b>product customization ability</b>	1	2	3	4	5	
Increasing <b>volume flexibility</b>	1	2	3	4	5	
Increasing <b>mix flexibility</b>	1	2	3	4	5	

Reducing <b>time to market</b>	1	2	3	4	5
Increasing <b>product innovativeness</b>	1	2	3	4	5
Improving <b>customer service and support</b>	1	2	3	4	5
Increasing <b>delivery speed</b>	1	2	3	4	5
Increasing <b>delivery reliability</b>	1	2	3	4	5
Reducing <b>unit manufacturing cost</b>	1	2	3	4	5
Reducing <b>manufacturing lead time</b>	1	2	3	4	5
Reducing <b>procurement lead time</b>	1	2	3	4	5
Reducing <b>procurement costs</b>	1	2	3	4	5
Increasing <b>labour productivity</b>	1	2	3	4	5
Increasing <b>inventory turnover</b>	1	2	3	4	5
Increasing <b>capacity utilization</b>	1	2	3	4	5
Reducing <b>overhead costs</b>	1	2	3	4	5
Improving <b>employee satisfaction</b>	1	2	3	4	5
Improving your <b>environmental performance</b>	1	2	3	4	5

B9. How has your operational performance changed over the last three years? How does your current performance compare with main competitor(s)\*?

	Compared to three years ago the indicator has					Relative to our main competitor(s), our performance is				
	deteriorated more than 10%	stayed about the same	improved 10%-30%	improved 30%-50%	improved more than 50%	much worse	equal	much better		
Manufacturing conformance	1	2	3	4	5	1	2	3	4	5
Product quality and reliability	1	2	3	4	5	1	2	3	4	5
Product customization ability	1	2	3	4	5	1	2	3	4	5
Volume flexibility	1	2	3	4	5	1	2	3	4	5
Mix flexibility	1	2	3	4	5	1	2	3	4	5
Time to market	1	2	3	4	5	1	2	3	4	5
Product innovativeness	1	2	3	4	5	1	2	3	4	5
Customer service and support	1	2	3	4	5	1	2	3	4	5
Delivery speed	1	2	3	4	5	1	2	3	4	5
Delivery dependability	1	2	3	4	5	1	2	3	4	5
Unit manufacturing cost	1	2	3	4	5	1	2	3	4	5
Manufacturing lead time	1	2	3	4	5	1	2	3	4	5
Procurement lead time	1	2	3	4	5	1	2	3	4	5
Procurement costs	1	2	3	4	5	1	2	3	4	5
Labour productivity	1	2	3	4	5	1	2	3	4	5
Inventory turnover	1	2	3	4	5	1	2	3	4	5
Capacity utilization	1	2	3	4	5	1	2	3	4	5
Overhead costs	1	2	3	4	5	1	2	3	4	5
Employee satisfaction	1	2	3	4	5	1	2	3	4	5
Environmental performance	1	2	3	4	5	1	2	3	4	5

\*consider the average performance of the group of competitors that are the direct benchmark for the plant

PD4. To what extent do the following stakeholders collaborate with the R&D function in your product development process?

	<b>No collaboration</b>		<b>High collaboration</b>		
Suppliers	1	2	3	4	5
Manufacturing	1	2	3	4	5
Marketing	1	2	3	4	5
Customers	1	2	3	4	5

SC5. Indicate the following supplier figures:

Total number of suppliers (figure for 2004)	Average number of suppliers per item	Proportion of suppliers considered as key/strategic suppliers	%
_____	_____	_____	_____

Table 1. Classification of companies (percentages in relation to the total sample size of 640 companies)

	National Competitors	Global Competitors	Total
National Manufacturers	<b>41</b> <b>focused</b> (6.4%)	<b>107</b> <b>inside-out</b> (16.7%)	148 (23.1%)
Global Manufacturers	<b>8</b> <b>outside-in</b> (1.3%)	<b>76</b> <b>distributed</b> (11.9%)	84 (13.2%)
Total	49 (7.7%)	183 (28.6%)	232 (36.3%)

Table 2. Differences concerning environment (\* p<0.05)

	Inside-out (average)	Distributed (average)	T-value
Market growth	3.42	3.55	1.00
Market span	3.16	3.18	0.14
Product focus vs. service focus	2.78	2.93	1.01
Geographical focus	4.47	4.68	2.10*
Competition intensity	4.26	4.35	0.68
Market concentration	3.36	3.57	1.18
Easiness of market entry	3.07	3.03	-0.20

Table 3. Differences in financial and manufacturing performance (only significant results displayed; \* p<0.05, \*\* p<0.01)

	Inside-out (average)	Distributed (average)	T-value
Sales, absolute [USD] (A6a)	90M	600M	2.51*
Sales, compared to competitors (A6i)	3.31	3.63	2.39*
RoS, compared to competitors (A6m)	3.03	3.40	2.39*
RoI, compared to competitors (A6n)	4.47	4.68	2.69**
Throughput time efficiency [%] (B10a)	51.55	36.20	-2.74**



Table 4. Differences in order winners (only significant results displayed; \* p<0.05)

	Inside-out (average)	Distributed (average)	T-value
Product design and quality (A5ab)	4.44	4.17	-2.51*
Customer service (A5af)	3.83	4.09	1.95*
Product range (A5ag)	3.27	3.56	1.99*
Frequent new products (A5ah)	3.10	3.46	2.03*
Product innovation (A5ai)	3.51	3.90	2.36*

Table 5. Comparison of strategic priorities and strategic capabilities (only significant results displayed; \* p<0.05)

	Inside-out (average)	Distributed (average)	T-value
Reducing time to market (B4f)	3.80	4.13	2.29*
Product customization ability compared to 3 years ago (B9ac)	2.76	3.03	2.37*
Capacity utilization compared to 3 years ago (B9as)	2.92	2.64	-2.14*

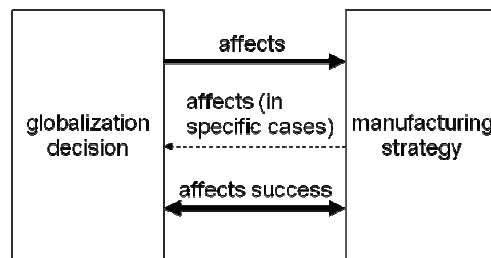


Figure 1. Conceptual linkages between globalization decision and manufacturing strategy

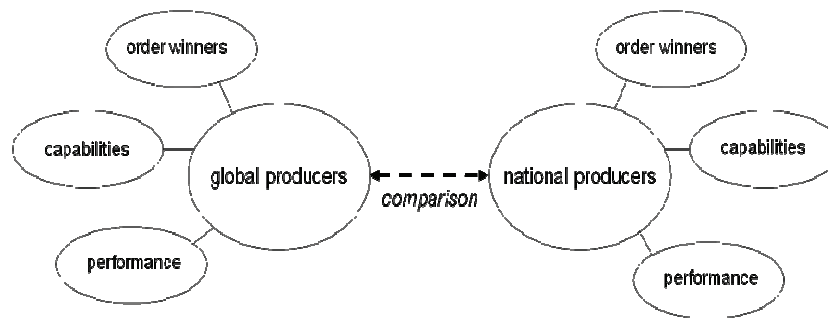


Figure 2. Research design