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International operations and export performance: an empirical study

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Abstract

Purpose – The purpose of this paper is to analyze the role of operations management in the development of international operations – international operations being considered as distribution centers, services and manufacturing plants abroad.

Design/methodology/approach – The proposed model evaluates the relationship between international operations, cross-functional orientation (CFO) and company's exports performance. A survey was carried out with 99 companies from two industries (machinery and food) located in a newly industrialized country. The data were analyzed through structural equation modeling.

Findings – The results suggest the existence of a relation between international operations and company's performance and also that international operations are positively related to CFO.

Research limitations/implications – The sampling frame is limited to only two industries: machinery and food and to companies located in southern Brazil.

Originality/value – The paper is of value in showing how the process of internationalization should be an integrated action which leads to better performance. This is especially important for companies starting their internationalization process and should be tested in other industries and countries.

Keywords Operations management, Exports, Newly industrialized economies, Brazil

Paper type Research paper

1. Introduction

For the several past decades, the importance of including the manufacturing function in the development of the corporate strategy has been discussed in the literature on operations strategy (Skinner, 1969; Wheelwright, 1984; Hayes *et al.*, 2004; Bayraktar, *et al.*, 2007). One of the major concerns addressed by this literature has been how to integrate manufacturing with the other functional areas, so as to improve the company's competitiveness. One of the main aspects of cross-functional (CF) integration is the alignment of a company's strategic decisions (Ward *et al.*, 1994). More recent articles have investigated the impact of the integration of manufacturing and other functional areas strategic decision on organizational performance (Papke-Shields and Malhotra, 2001; O'Leary-Kelly and Flores, 2002).

A strategic decision that is part of a company's corporate strategy is international operations (Dunning, 1988). International operations and global sales of manufactured products have expanded intensively in the last years. However, very few studies have investigated the impact of manufacturing CF integration on international operations. Thus, this study aims at analyzing the extent to which manufacturing CF integration influences international operations and performance. The theoretical background for our investigation is the strategy-structure research framework (Paterson and Brock, 2002).

2. Literature review

2.1 *The internationalization process*

We follow the theoretical approach outlined by Melin (1992), which proposes that a company's international strategy will influence the company's structure. Studies on



international operations dealing with structure usually analyze issues like structure flexibility, level of integration and responsiveness (Paterson and Brock, 2002; Bartlett and Ghoshal, 2000a, b; Evan *et al.*, 1989).

The analysis of corporate strategies reveals that companies follow different orientations for internationalizing operations (De Witt and Meyer, 1994). Porter (1986) identifies multi-domestic and global strategies. In the former strategy, a company maintains separate operations in different countries. In the later strategy, companies sell globally and maintain centralized operations. In a review of the international operations management research, Prasad and Babbar (2000) analyzed studies related to a wide variety of themes including costs, operations location and logistics and point out that international operations may improve the effectiveness of a company's international operations strategy and that companies may benefit from global synergies.

Studies on international operations typically focus on issues at the operational level, such as quality systems or productivity. Very few articles investigate international operations from a strategic perspective. For instance, a few studies have investigated the international configuration of operations and the effectiveness or adaptation of these configurations to foreign markets (Prasad and Babbar, 2000). In another rare study at the strategic level, Whybark (1997) pointed out that European companies move faster to international markets than their North-American counterparts. The underlying reason seems to be that the North-American companies have a wider local market available, in contrast to the European companies. Nevertheless, the formation of the European Union may change this aspect.

Interestingly, companies located in some emerging countries with large population, such as Brazil, also present slow movement towards international markets when compared to, for instance, Korean or Taiwanese companies. Cyrino and Oliveira Jr. (2002) analyzed the 109 larger Brazilian companies. Among them, only 27 per cent had international operations or international trade activity. The reason pointed out for their slow movement towards international markets was the potential size of the Brazilian market, domestic taxes over exports, lack of financial support and foreign trade barriers.

In the last few decades, however, Brazilian companies have faced increased pressure to internationalize their operations (*The Economist*, 2000). Therefore, Brazilian companies that have internationalized are an excellent source to investigate the effectiveness of international operations and exporting performance.

2.2 The search for global competitiveness in emerging countries

The increasing global pressures over the Brazilian market include decreasing import taxes, foreign investments and participation in regional economic agreements. Brazilian focus on domestic markets has been pointed out by both the press (*The Economist*, 2000) and academic publications (Bartlett and Ghoshal, 2000a, b). Lately, some Brazilian executives state that even with the Brazilian economy stability, external markets may keep the revenues more stable without strong oscillations caused by internal facts.

Small and mid-sized companies face several difficulties. Difficulties include the change from a simple exporter to an international investor, the lack of knowledge and the scarcity of resources, lack of access to knowledge about international markets and managers with international experience (Karagozoglu and Lindell, 1998; Yip *et al.*, 2000).

Bartlett and Ghoshal (2000a, b) investigated the issues faced by what they named “late movers” those companies from emerging countries that have started global operations. They state that in order for late movers to achieve a global competitiveness, they have to deal with: the need for global brands; the clear understanding of cultural issues in foreign markets; and the search for products with higher value-added. These issues and difficulties are directly related to the CF integration of decisions. Companies may only be able to develop high valued products for international markets if there is a clear integration between R&D, marketing, manufacturing and other company’s areas.

2.3 International operations

International operations was recognized as an important and growing trend for decades (Barnes, 1969). Recently, Khurana and Talbot (1998) argued that the traditional ethnocentric approach presented in the Uppsalla internationalization model (Johanson and Vahlne, 1977) and international life cycle product (Vernon, 1979), which focused on developed countries companies, was no longer valid. The current competitive environment is characterized by companies from industrialized, newly industrialized and developing countries. In this context, plants and R&D offshore will have new rules in the company’s internationalization strategy, such as seeking new technologies.

Some studies claim that investments in offshore plants follow a process of strategic choice based on organizational structure and configuration (Ferdows, 1997; Dubois and Oliff, 1992). Other studies also analyze issues related to other parts of the value chain including logistics and distribution activities. In this case, coordination and configuration are influenced by global or local supply and competitive criteria (Meijboom and Voss, 1997). International distribution and logistics are the drivers of the development of international competence (Fawcett, 1992; Fawcett *et al.*, 1997). Thus, it is worthy to analyze the internationalization process focusing on each part of the value chain.

Offshoring plants is one of the most advanced steps of the process of internationalization, which involves also exports/sales offices, international services and distribution centers. Some authors consider the offshore investment as a strategy to internationalization more sophisticated and complex than joint ventures or strategic alliances (Hill *et al.*, 1990). Companies making offshore investment face a lower risk of competence diffusion when compare to strategic alliance. However, offshore investment requires higher commitment of a company’s resources.

Different configurations emerge in the provision of global or multi-domestic services (Meijboom and Houtepen, 2002). International services may be analyzed from an object-based perspective. In this case, they are embedded in the goods such as electronics and machinery (Clark *et al.*, 1996). In a similar way, there are the combination services: “. . . part of the production process is location-bound and another part is capable of producing a foreign-tradeable product” (Boddweyn *et al.*, 1986).

We argue that international operations are configured by manufacturing, distribution centers and service operations abroad. We may analyze international operations based on a two-dimension approach: configuration, which deals with the location of the unit; and coordination, which deals with the level of coordination among different units. In terms of configuration, the location of the unit is influenced, for example, by sources of raw material, and proximity to suppliers and markets (Porter, 1986). Configuration may also be analyzed from an operations value chain perspective (De Toni and Forza, 1992). The main differences between this approach and the

traditional Porter's proposal are the inclusion of R&D as a primary activity and the exclusion of the marketing and sales activities.

A group of barriers to international operations effectiveness will affect international operations performance: the lack of a global view by managers, manufacturing strategy not clear, and difficulties to manage international factory networks and global logistics (Klassen and Whybark, 1994).

2.4 Operations strategy and cross-functional orientation (CFO)

The literature on operations strategy has highlighted the importance of a proactive role of manufacturing managers in the corporate strategy. A proactive insertion of manufacturing management may occur through CF efforts during the strategic process (Ward *et al.*, 1994; Boyer and Lewis, 2002; Hausman *et al.*, 2002).

Literature has highlighted the importance of companies' insertion within global networks in order to improve their learning processes and enhance global business (Yip *et al.*, 2000; Björkman and Forgsren, 2000). Many times, a company's entry in a global network starts with formal agreements such as franchise or organizational arrangements like joint venture and strategic alliances (Andersen, 1993).

Usually the cooperation in global networks involves a CF effort, including manufacturing, marketing, R&D, and supply, among others. Internally to the company, we may investigate whether there is an increasing participation of manufacturing in the strategic process after the actions towards international operations. Ward *et al.* (1994) and Hausman *et al.* (2002) showed the importance of a CF approach to manufacturing performance. In both studies, CF decision making is identified as one of the central issues in creating capabilities.

The same should be expected when companies are expanding their international operations. The level of complexity brought about by different market needs, heightened need for coordination of operations, and competitive pressures should lead to a better integration between manufacturing and the other functional areas.

Based on the theoretical references we integrate the three main aspects analyzed in this article: CFO, international operations and performance (Table I).

Construct	Domain	Theoretical references
CFO	Extent to which manufacturing participates in the strategic process	Skinner (1969); Wheelwright and Hayes (1985); Ward <i>et al.</i> (1994); Boyer and McDermott (1999); Ward and Duray (2000); Hausman <i>et al.</i> (2002); Papke-Shields <i>et al.</i> (2001); Malhotra and Sharma (2002)
International operations	Extent to which operations is internationalized	Johanson and Vahlne (1977), Porter (1986); De Toni and Forza (1992); Meijboom and Voss (1997); Khurana and Talbot (1998); Yip <i>et al.</i> (2000)
Performance	Business performance	Karagozoglu and Lindell (1998); Papke-Shields and Malhotra (2001); O'Leary-Kelly and Flores (2002)

Table I.
Constructs and their
theoretical domains

3. Study hypotheses

We define international operations as orientation as the presence of manufacturing, distribution centers and service operations abroad (Johanson and Vahlne, 1977; Klassen and Whybark, 1997 and Shi and Gregory, 1998). Decisions regarding the international insertion of one or more operations activity are strategic and they increase the complexity of manufacturing management. Furthermore, they impact and depend on decisions in other functional areas of the company. As such, these decisions require higher levels of functional integration. Therefore, we propose that companies with international configuration will seek to develop increased CFO (Hill *et al.*, 1990; Andersen, 1993; Hausman *et al.*, 2002). We arrive at the following hypothesis:

H1. International operations orientation is positively correlated to CFO.

Kahn and McDonough III (1979) showed that collaboration is positively related to performance. Leary-Kelly and Flores (2002) also explored the link between performance and manufacturing and marketing integration. These studies suggest that CF integration leads to a higher alignment in the strategic process and, consequently, to a better performance. Therefore, we propose that when strategic decisions are shared among different functional areas, the company's performance will be improved. We arrive at our second hypothesis:

H2. CFO is positively correlated to company's performance.

When companies establish international operations, they face new competitive standards (Fawcett, 1992). As they progressively develop new competencies to cope with the new standards, they achieve higher levels of performance (Prasad and Babbar, 2000, Yip *et al.*, 2000 and Simon, 1997). Therefore, we hypothesize:

H3. International operations orientation is positively correlated to company's performance.

4. Methodology

Our questionnaire methodology involved three steps:

- framework validation with other researchers and with three companies;
- first mail of the final questionnaire to the chosen sample; and
- second mail to non-responding companies.

We developed the variables based on the theoretical domains presented in the Table I. The Appendix provides pertinent questions from the questionnaire. The data were collected in 2001 and 2002.

Companies located in Southern Brazil, including transnational and Brazilian owned companies, form the sample. We used a database from the Brazilian Service Support to Private Companies (Sebrae). For the purpose of this study we selected two major Brazilian industries that have presented increasing international operations orientation: Machinery and food. The sample size was 366 companies and the response rate was 27.2 per cent (99 companies) with a sample error equal to 5 per cent. All the companies in the sample have more than 100 employees (Table II). The typical respondent to the survey were CEOs, vice-presidents, manufacturing directors, and manufacturing managers. Table III shows the responders' profile.

Annual revenues measured the company size in the sample. Table IV shows that there is a proportional distribution regarding this profile characteristic.

5. Results

Our analysis is based on structural equation modeling. The advisable minimum size for the appropriate use of maximum likelihood estimate is 100, nearly the size of our sample (Hair *et al.*, 1995). At 5.21:1, our ratio exceeds the level suggested by Kline (1998) to assure model stability. However, Mardia's coefficient was equal to 4.77, indicating a significant kurtosis or non-normality in the data, justifying bootstrapping. Thus a bootstrap analysis was carried out with 1,000 bootstrap samples. According to Kline (1998), this technique provides additional empirical information about the variability of parameter estimates and fit indexes.

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In the first step, a large number of samples with replacement are taken and parameter estimates are computed for each one. If the majority of bootstrap χ^2 statistics exceed the values required for statistical difference, we may not state that the relative fits of the two models, the original and the second from the bootstrap analysis, are equal. We found that the parameters were adequate, as shown in Table III, especially the values in the columns "SE SE" and "Bias" that are low as expected.

Analyzing the structural equation model, the data confirm partially the hypotheses advanced above. We used the covariance matrix among the constructs identified by the theory and we analyzed the path model using the AMOS software. The result

Industry	Number of companies	Return rate (%)
Food	163	31 (19 %)
Machines	203	68 (30.3 %)
Total	366	99 (27 %)

Table II.
Return rate for each
industry

Function	Frequency	Per cent	Cumulative per cent
CEO	11	11.1	13.2
Vice-President	38	38.4	50.0
Industrial Director	10	10.1	60.2
Manufacturing Manager	30	30.3	90.8
Others	10	10.1	100.0
Total	99	100	

Table III.
Respondent's profile

Function	Frequency	Per cent	Cumulative per cent
Less than 5,000	22	22.2	22.2
5,000-25,000	31	31.3	53.5
25,001-250,000	21	20.2	74.7
More than 2,500,001	25	25.3	100
Total	99	100	

Table IV.
Company's profile –
annual revenues
(US\$1,000)

($\chi^2 = 14.25$, $df = 17$, $p = 0.65$) indicates that there is a non-significant difference between the actual and the predicted matrices (Hair *et al.*, 1995). However, other statistical tests are necessary to indicate significant results (Bollen and Long, 1993; Kline, 1998). GFI and AGFI values indicate a reasonable fit of the data with the hypothesized model (GFI = 0.97; AGFI = 0.92). All other tests also show a good overall fit (RMR = 0.06; RMSEA = 0.00; NFI = 0.96; IFI = 1.01; CFI = 1.00; TLI = 1.01) (Table V).

We analyzed also the form invariance (H_{form}) between the two samples (machinery and food). Both presented Chi-square equal to 14.25 and $p < 0.65$. The fit measures such as GFI, AGFI, NFI and CFI are in appropriate ranges (from 0.91 to 1.00). Therefore, this result indicates that both samples present the same form (i.e. the null hypothesis of same form can not be rejected) (Table VI).

We performed a second analysis to evaluate all the relationships in the two samples in order to check if they are the same. This is achieved by fixing the scales to 1. In this case, the fit values also reach satisfactory levels (from 0.91 to 1.00). The null hypothesis of H_{TB} is acceptable, considering that the Chi-square difference is equal to 4.57 and statistically significant. Therefore, the test suggests that both samples have similar characteristics and can be analyzed jointly.

The constructs identified through the model were:

- (1) The internal operations orientation (IOP) construct has the following variables: the extent that manufacturing is internationalized (IOP1), the extents that

Table V.
Regression parameter
standard error estimates
related to bootstraps
analysis

Parameter		SE	SE-SE	Mean	Bias	SE-Bias
PERF	CFO	0.184	0.004	1.470	-0.010	0.006
PERF	IOP	0.436	0.010	1.291	0.033	0.014
CFO1	CFO	1.129	0.029	0.755	0.150	0.041
CFO2	CFO	0.093	0.002	0.502	-0.012	0.003
CFO3	CFO	0.112	0.003	0.323	-0.012	0.004
IOP1	IOP	0.334	0.007	0.643	-0.032	0.011
IOP2	IOP	0.081	0.002	0.156	-0.002	0.003
IOP3	IOP	0.300	0.007	0.517	-0.051	0.009
EXP	PERF	0.164	0.004	1.506	-0.045	0.005
PROF	PERF	0.166	0.004	0.481	-0.033	0.005
CFO	IOP	1.357	0.030	1.336	-0.217	0.043

Table VI.
General statistics for
goodness-of-fit

<i>Stand alone indices</i>	
Chi-square	14.25
Degrees of freedom (df)	17
Probability level	0.65
Goodness of fit (GFI)	0.97
Adjusted goodness of fit (AGFI)	0.92
Standardized RMR	0.06
RMSEA	0.00
<i>Incremental indices</i>	
Normed fit index (NFI)	0.96
Incremental fit index (IFI)	1.01
Comparative fit index (CFI)	1.00
Tucker-Lewis coefficient (TLI)	1.02

distribution centers are internationalized (IOP2) and the extent that services are internationalized (IOP3).

- (2) The CFO construct includes the following variables: CF activities are used for production and services decisions related to manufacturing strategies, marketing and R&D (CFO1), CF activities are used in order to decide long term investments (CFO2) and CF activities are used to decide about the business unit's growth strategy (CFO3).
- (3) The exports performance (PERF) construct includes the following variables: ratio between exports and total sales (PERF1), exports increase in the last period (PERF2).

We assessed performance as a two-dimensional construct. The first dimension evaluates the ratio between exports and total sales. The second dimension seeks to evaluate whether a company improved its international sales in the last period.

We analyzed also the form invariance (H_{form}) between the two samples (machinery and food). Both presented Chi-square equal to 14.25 and $p < 0.65$. The fit measures such as GFI, AGFI, NFI and CFI are in satisfactory values (from 0.91 to 1.00). Therefore, this result indicates that the both samples present the same form (i.e. the null hypothesis of same form can not be rejected) (Table VI).

A second analysis evaluates all the relationships in the two samples, analyzing if they are the same. This is obtained fixing the scales at 1. In this case, the fit values also reach satisfactory levels (from 0.91 to 1.00). The null hypothesis of H_{TB} is acceptable considering that the Chi-square difference is equal to 4.57 and statistically significant. Therefore, the test suggests that both samples have similar characteristics and can be analyzed jointly.

6. Analysis

The first hypothesis relates international operations orientation (IOP) to CFO. We found this hypothesis to be statistically significant. As such, the results suggest that companies that have international operations present high levels of CFO. This result was as predicted by our theoretical arguments, considering that this type of company typically operates in highly complex internal and external environments. High CFO also presents a positive relationship with international sales performance (PERF). Therefore, the second hypothesis was also confirmed, because the result is statistically significant. The data show that cross-functionality is a key aspect for internationalization (see Table VII and Figure 1).

The role of cross-functionality is complementary to the proactiveness orientation in product development or in strategic formulation, as stated by Ward *et al.* (1994). Thus, a company's international configuration strategy will not be successful without integration between manufacturing, marketing, and supply, among others. The results are consistent with the literature on operations strategy (Skinner, 1969; Wheelwright, 1984; Ward *et al.*, 1994) and international strategy (Porter, 1986).

We also found that international operations orientation (IOP) is positively related to exports performance (PERF), confirming the last hypothesis. This result suggests that companies with an international operations orientation are able to develop new competencies to compete in different environments. As a result, these companies are able to build superior performance. The two dimensions of our performance variable highlights this point. Therefore, in the analysis of our sample, we found that the companies that have higher involvement in international operations exhibit higher levels of exports, whereas those that are not internationalized or are still in the first stages exhibit lower levels.

Finally, the result suggests that international operations are a strategic choice to the companies with better performance on exports. In this aspect, the existence of distribution centers and services abroad seems to be key aspects to success, jointly with CFO. We advance that, through international operations, companies get access to market knowledge and to new technologies. They are also able to learn and improve their processes by operating in a new competitive environment. Consequently, international operations may leverage the ability of a company to better compete on its original national market, improving its overall performance.

7. Conclusions

The results of this study suggest that an international operations orientation and a CFO are key aspects to superior performance in the companies from the sample analyzed.

Our model proposed that an international operations orientation would be positively correlated to performance. We found this relationship to be statistically significant, indicating that an operations strategy with higher levels of international involvement may lead to higher performance. We particularly see that companies with higher levels of international operations orientation will have superior exporting performance. Although this result may have been expected theoretically, we demonstrated it empirically.

	H_{form}	$H_{\Gamma B}$
Chi-square	12.20	16.77
Degrees of freedom (df)	17	20
Probability level	0.78	0.67
Goodness of fit (GFI)	0.95	0.94
Adjusted goodness of fit (AGFI)	0.91	0.89
Standardized RMR	0.08	0.34
RMSEA	0.00	0.00
<i>Incremental indices</i>		
Normed fit index (NFI)	0.95	0.93
Incremental fit index (IFI)	1.02	1.00
Comparative fit index (CFI)	1.00	1.00

Table VII.

Tests of invariance of path model across calibration and cross-validation samples

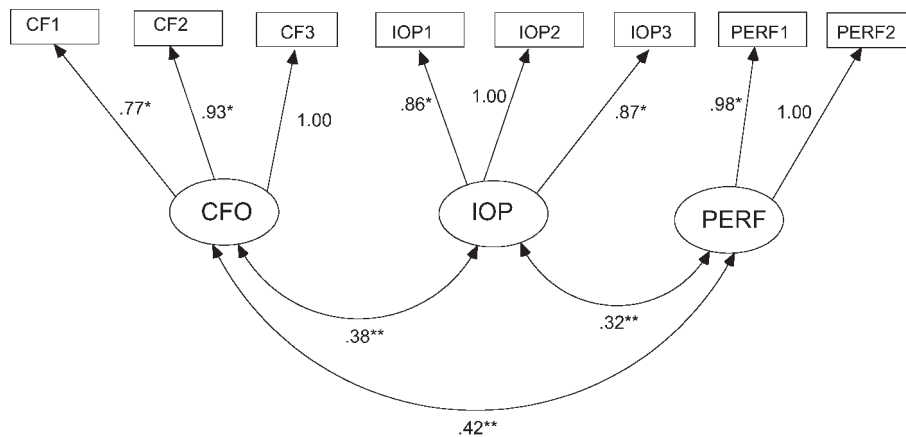


Figure 1.
Theoretical model linking international operations and company's performance

Notes: $p < 0.05$; $p < 0.01$

Our model also proposed that a CFO would be positively related to exports performance and to international operations orientation. These relationships were also found to be significant, indicating that operations abroad create possibilities to develop or to strengthen a company's global capabilities. Furthermore, companies with operations abroad, including services, manufacturing and distribution centers, require a higher level of CF integration between operations and other functional areas. This is necessary in order to coordinate and define strategies in a high complex environment (internally and externally).

As a theoretical contribution, we demonstrate in this article that the interface between operations strategy and international management offer consequential and promising avenues to research, as initially suggested by Whybark (1997). As a contribution to theory with implication to practice, our study suggests that the process of internationalizing operations cannot be handled isolated from other functional areas. Companies with a CFO seems to be more inclined to invest abroad and seems to stand a better chance to achieve success. This is especially important for companies in new industrialized countries, such as Brazil, that are starting their internationalization process. Some of the hurdles that these companies face are the higher levels of competition in international markets and the existence of products with higher value-added. As such, companies with a CFO should stand a better chance to understanding the international requirements and come up with superior processes to meet them. These efforts are needed for the process of building a global brands (Simon, 1997; Yip *et al.*, 2002 and Karagozoglu and Lindell, 1998).

Our study has limitations, which provide good sources for future studies. First, our sampling frame is limited to only two industries: Machinery and food. Future studies may want to identify and include other industries that have started to internationalize. Second, the sampling frame is limited to companies located in southern Brazil, so future studies may want to extend the study to the whole Brazilian market. Therefore, all the results and possible generalizations should be considered with parsimony.

The overall results of our study lead us to conclude that the exporting performance of a company with operations on a single country may be poor. As such, having no or lower levels of international operations may not be the best strategic choice. We advance that companies should committee to higher levels of international operations in order to improve their exports. We suggest that future researchers replicate our study including other industries and other newly industrialized countries.

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Appendix

Cross-functionality (CF) – indicate to which extension the following activities are based on CF activities:

- (1) Production and service decisions related to manufacturing strategies, marketing and R&D.
- (2) Budget decisions related to long term investments.
- (3) Decisions related to the strategy of growth of the business unit (Ward *et al.*, 1994).

Never	Rarely	Sometimes	Frequently	Always
1	2	3	4	5

International Operations 1 – Indicate to which extension manufacturing is internationalized:

Zero	Starting	First stage	Consolidating	Advanced (Three Un.)
1	(One Un.)	(Two Un.)	(Three Un.)	(Three Un.)
	2	3	4	5

International Operations 2 – Indicate to which extension company's distribution centers are internationalized:

Zero	Starting	First stage	Consolidating	Advanced (Three Un.)
1	(One Un.)	(Two Un.)	(Three Un.)	(Three Un.)
	2	3	4	5

International Operations 3 – Indicate to which extension company's services are internationalized:

Zero	Starting	First stage	Consolidating	Advanced (Three Un.)
1	(One Un.)	(Two Un.)	(Three Un.)	(Three Un.)
	2	3	4	5

Performance1 – Ratio between exports and total sales.
Performance 2 – Exports increase in the last period.

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