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Manufacturing and marketing integration from a cumulative capabilities perspective

Ely Laureano Paiva *

Fundação Getulio Vargas, São Paulo, Brazil

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ABSTRACT

A growing number of studies have analyzed the dynamics of integration among different functional areas in recent years. Manufacturing and marketing integration has been a relevant topic in management research since the classic articles of Shapiro and Crittenden decades ago. This study aims to evaluate the relationship between manufacturing and marketing integration, managerial priorities and business performance. We based our analysis on a cumulative capabilities approach. We used a survey methodology to collect the data. The sample includes 99 companies from food and machinery industries. These two industries are the main exporters in Brazil's economy. We used three scales in the proposed theoretical model: manufacturing and marketing integration, managerial priorities and business performance. The results suggest that manufacturing and marketing integration and managerial priorities positively influence business performance.

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1. Introduction

Literature has discussed the need for more collaboration and integration among different functional areas. Anecdotal references have also shown that companies are compelled to develop higher levels of integration between their functional areas in order to strengthen their capabilities and improve business performance. Since the publication of seminal articles like Shapiro (1977) and Crittenden (1992), different studies have highlighted the importance of how manufacturing and marketing integration may affect performance. Consistently, articles exploring manufacturing and marketing integration and performance have explored this issue from different perspectives.

Modeling studies have proposed optimal production decisions regarding manufacturing and marketing integration (Lee and Kim, 1993; Feng et al., 2008). According to Pal et al. (2007), business performance improves when manufacturing meets the demand based on the market's department decisions. Empirical studies like Hausman et al. (2002) have also shown that business performance is positively related to higher levels of integration among manufacturing and other functional areas. Empirical studies usually use traditional performance measurements, such as profitability and market performance. On the other hand recent studies have analyzed operational performance beyond business performance (Rosenzweig et al., 2003; Swink et al., 2007). Nevertheless, they followed a traditional approach, and each single competitive criterion was analyzed as a separate dimension. Conversely, we based our analysis on a cumulative capabilities approach. This means that management priorities are related to multiple competitive criteria simultaneously. Thus, the research question of this study is: what is the influence of manufacturing and marketing integration on business performance when manufacturing management is related to the cumulative capabilities approach? We analyzed manufacturing and marketing integration using three perspectives: problem solving, coordination and new product development. Usually previous studies explore one of these aspects. We expect that high operational performance in multiple competitive criteria is a manufacturing objective for high business performance companies. We included a firm-size variable in order to mediate manufacturing and marketing integration, managerial priorities and business performance in the proposed model.

The article is structured as follows: Section 1, we present the theoretical references; Section 2, the research methodology is discussed; Section 3, we present the results and Section 4, we present the conclusions.

2. Operations performance and synergetic perspective

Operations performance is usually linked to the competitive criteria. The four competitive criteria (quality, cost, flexibility and delivery) with slight variations have been cited by many authors in previous decades, such as Wheelwright (1984), Miller and Roth (1994), Ward et al. (1998), McKone et al. (2001) and Boyer and Lewis (2002). Swink et al. (2007) used operational performance

* Tel.: +55 11 3799 3656; fax: +55 11 3799 7761.
E-mail address: ely.paiva@fgv.br

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measures based on cost, quality, delivery, process flexibility and product flexibility to evaluate manufacturing integration with other functional areas.

Operations performance and competitive priorities are repeatedly analyzed based on the logic of trade-offs. Trade-offs can be expressed through a function of two variables that are inversely correlated (Hayes and Pisano, 1996). The concept of trade-off should orient manufacturing decisions on the shop-floor and along the supply chain (Skinner, 1969, 1974; Wheelwright, 1984). Recently, other articles have identified the existence of trade-offs between competitive criteria such as flexibility, cost and delivery (Boyer and Lewis, 2002). Nevertheless, Silveira and Slack (2001) state that sometimes managers have difficulty understanding and identifying the trade-off concept in a practical view.

An alternative model for trade-offs is expressed through a synergetic approach. The sand cone model is the main example of this approach, which claims that a new capability is built based on previously existing ones (Collins et al., 1998; Corbett and Wassenhove, 1993; Ferdows and De Meyer, 1990). Thus, cumulative capabilities perspective suggests that there is a sequence of capabilities that is developed over time. Ferdows and De Meyer (1990) claimed that the sequence of capabilities building was: quality, dependability, flexibility and, at the end, cost. Therefore, the idea of cumulative capabilities, instead of inversely related dimensions, is the key aspect in the sand cone model (Ferdows and De Meyer, 1990). In this case a capability related to a competitive criterion will be positively related to other capabilities (Mapes et al., 1997; Noble, 1995; Rosenzweig and Roth, 2004).

There is not a consensus on this topic among authors, however. Flynn and Flynn (2004), in a cross-country study, did not identify a single pattern in the sequence of capabilities as suggested by Ferdows and De Meyer. Conversely, the authors found that according to the industry or country, companies will arrange a group of capabilities in order to achieve their strategic objectives.

With a similar view, the concept of world-class manufacturing (Schonberger, 1986) also has an alternative approach to the trade-off concept. In this case, companies would seek to improve quality, cut costs and reduce lead times concurrently.

In this study we expected that managers from the most competitive companies would seek to achieve high performance in several competitive criteria simultaneously through cross-functional integration. Several studies have empirically suggested the existence of this approach in recent years (Ferdows and De Meyer, 1990; Vickery et al., 1993; Ward et al., 1994; Flynn and Flynn, 2004). Thus, companies focus instead on a narrow group of competitive criteria due to the trade-off approach, which argues they could accomplish a high performance in multiple competitive criteria simultaneously.

3. Manufacturing and marketing integration

The link between performance and manufacturing's cross-functional integration appears frequently in literature (Ward et al., 1994). Hayes (2002) stated that manufacturing must act beyond the functional silos in order to achieve a performance suited to the current competitive landscape.

Related to this approach, integration between manufacturing and marketing has been focused upon in past decades by conceptual articles including Shapiro (1977), Hutt and Speh (1984) and Crittenden (1992). These articles argued that higher integration improves business and operational performance. At the same time, research on manufacturing and marketing integration in OM has followed a variety of foci. Parente (1998) listed different approaches in manufacturing–marketing integration studies. One approach is related to the hierarchical level: strategic, tactical or operational. According to Parente, contact between the actors is more direct at the operational level, because shorter time adjustments are needed in this context. On the tactical level, individual characteristics are not at the center of the interaction, while individual and functional integrations are in the spotlight at the strategic level. Malhotra and Sharma (2002) also listed key-decision areas, which are dependent on cross-functional integration between manufacturing and marketing. These areas include strategic planning integration, strategic or visionary forecasting, new product/process development, tactical forecasting, demand management and operational integration. As an example of demand management we may mention sales and operations planning (S&OP) that can balance inventories, on-time deliveries and operations costs (Genin et al., 2005). An integrated S&OP may support the infrastructural perspective "in terms of planning strategies for production relative to sales, inventory and/or backlog the various life cycle stages, e.g. taking market growth rate into account" (Olhager et al., 2001, p. 224). Therefore, managerial practices like S&OP are able to integrate manufacturing and marketing and to improve performance.

In addition, O'Leary-Kelly and Flores (2002) analyzed manufacturing and marketing integration regarding product/process development and marketing/sales planning. Hausman et al. (2002) explored cultural aspects related to manufacturing and marketing integration and its influence on performance. Similarly, Calantone et al. (2002) analyzed communication and marketing's understanding of the manufacturing processes. In this study, we explore the extent that integration occurs in activities like new product development, coordination process and problem solving.

4. Marketing and operations integration and performance measurement

Studies that focus on manufacturing and marketing integration and performance usually use two groups of measure for performance. One is linked to the operational level and the other to the business level.

Primary examples for operational measures are Rosenzweig et al. (2003) and Swink et al. (2007), which used the traditional competitive criteria (cost, quality, flexibility and delivery). Both studies identified that increasing integration may positively influence operational performance variables. It is worth highlighting that some managerial practices have a direct influence in cross-functional integration. Kaynak (2003) showed that quality management leads to better operational and business performance when different functional areas are integrated, including manufacturing and marketing. The operational measures used in this study were quality, productivity, cost and inventory turn-over. Other articles that analyze new product development (NPD) have used performance variables related to the project. Song et al. (1997) identified that marketing, manufacturing and R&D have similar perceptions related to the antecedents and consequences of cooperation among these three functional areas during NPD. The results suggest that higher integration improves product quality and NPD cycle time. Tatikonda and Montoya-Weiss (2001) also analyzed project process and identified that process characteristics such as concurrency, formality and adaptability positively influence product quality, unit cost and time-to-market (flexibility). Using a different operational performance measure, Olson et al. (2001) analyzed the integration of manufacturing and marketing in projects of new products. They found that higher levels of integration led to more innovative projects.

Hausman et al. (2002) and O'Leary-Kelly and Flores (2002) are examples of business-level analysis that used financial and market measures. Hausman et al. (2002) empirically identified a positive relationship between performance and manufacturing and marketing integration when exploring cultural aspects. O'Leary-Kelly and Flores (2002) also explored the link between manufacturing and marketing integration and business performance. The authors used performance variables related to profitability and found that performance is moderated by a firm's business strategy and by environmental uncertainty. Kaynak (2003) developed her analysis based on financial and market performance measures as well, including profitability, market share and sales growth. Similarly, Feng et al. (2008) showed that a more integrated planning process with key functional area participation has a positive influence on profitability when compared to traditional decoupled processes.

Therefore we may state that research on manufacturing and marketing integration has developed multiple formats for evaluating performance, using operational, financial and market measures. In our case, we used operational measures as antecedents for business performance. Nevertheless, diverging from prior studies, we analyzed them as one single construct using the cumulative capability perspective.

5. Hypotheses

Manufacturing and marketing integration may occur in different activities like new product development, coordination process and problem solving (Malhotra and Sharma, 2002). Based on the cumulative capabilities approach companies may have high performance in multiple competitive criteria simultaneously (Ferdows and De Meyer, 1990; Mapes et al., 1997; Noble 1995; Rosenzweig and Roth, 2004). Thus, we hypothesize that companies with a high level of manufacturing and marketing integration will implement high performance in multiple competitive criteria. Therefore, we may state the first hypothesis:

Hypothesis 1. Activity-oriented integration between manufacturing and marketing is positively related to a high performance orientation in multiple competitive criteria.

Authors like Parente (1998) and Malhotra and Sharma (2002) stated that manufacturing and marketing integration address different activities like coordination, new product development and operational aspects. Different authors have argued that manufacturing and marketing integration leads to high performance (Hausman et al., 2002). Therefore, manufacturing and marketing are key functional areas for company's performance (Parente, 1998). We should expect that companies with higher levels of manufacturing and marketing integration will present a high performance at the business level (O'Leary-Kelly and Flores, 2002; Rosenzweig et al., 2003; Swink et al., 2007). Therefore, we may list the second hypothesis:

Hypothesis 2. Activity-oriented integration between manufacturing and marketing activities is positively related to business performance.

According to the synergetic performance approach, companies in the most competitive levels present higher performance in all the competitive criteria (Schonberger, 1986; Ferdows and De Meyer, 1990; Mapes et al., 1997; Rosenzweig and Roth, 2004). Therefore, we expect that companies seeking a high performance in multiple competitive criteria should present higher levels of business performance. In this way, we propose the third hypothesis:

Hypothesis 3. High performance orientation in multiple competitive criteria is positively related to business performance.

6. Methodology

We carried out the research in two steps. The first step was an exploratory analysis and the second was a survey, which is discussed in the following sections. In the first step we studied three companies following an exploratory approach.

The first company was a manufacturing automation specialist. The second company was a component manufacturer for agricultural machines and heavy transport equipment, and a transnational companies' global supplier. The third company was a global competitor in the port-loading equipment market. These three cases oriented the first version of the questionnaire. Additionally, a group of three scholars and three managers analyzed the questions and suggested improvements.

We developed the variables based on theoretical domains discussed in the literature review. The questions are at the end of the article. We used a survey methodology to collect the data in order to test our hypotheses. We mailed the questionnaires twice.

In short, the steps followed during the field research were: (a) framework validation with researchers and managers; (b) first mail of the definitive questionnaire to the chosen sample and (c) second mail to no responder companies.

7. Sample

We sent the questionnaires to 366 companies located in the southern region of Brazil from the food and machinery industries. These two industries are the main Brazilian exporters. These companies were chosen from SEBRAE's (Brazilian Service for Companies' Support) database. All the companies have more than 100 employees. We received answers from CEOs, vice-presidents, manufacturing directors and manufacturing managers.

The response rate was 27.2% (99 companies). There was a response bias related to the industry, which may be related to the more dynamic environment that is characteristic of the machinery industry. This aspect may lead to a higher integration with universities and a higher response rate (Table 1).

Annual revenues measured the company size in the sample. Table 2 shows that there is a proportional distribution regarding this profile characteristic.

Table 1
Return rate for each industry.

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

Table 2
Company's profile—annual revenues (US$1000).

Function	Freq.	(%)	Cumulative percent
Less than 5000	22	22.2	22.2
5000–25,000	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	

8. Scales

We used three scales: manufacturing and marketing integration, managerial priorities and business performance.

The manufacturing and marketing integration scale measures to what extent these two functional areas are integrated in the three hierarchical levels, i.e. strategic, tactical and operational (Parente, 1998; Malhotra and Sharma, 2002) through cross-functional activities. Item I1 relates to the strategic level (product and service development). Item I2 evaluates the tactical level (integrated coordination) and item I3 focuses on the operational issues (problem solving).

The managerial priorities scale is related to the cumulative capabilities approach (Ferdows and De Meyer, 1990). We measured to what extent manufacturing management seeks to improve performance in the four competitive criteria simultaneously (cost, flexibility, quality and delivery). Finally, business performance scales focus on three dimensions of the business unit. One is related to financial performance (profitability). The second and the third evaluate market performance: sales increment and the rate between exports and total sales. We included this last item because for decades the Brazilian market had high trade barriers to foreign competitors. With the opening up of the Brazilian market in recent years, local companies are seeking to compete in international markets with different levels of success.

9. Validity and reliability analysis

We used confirmatory factor analysis (CFA) to verify validity and reliability. Unlike the exploratory factor analysis, CFA has as goal "to infer factor structure from the patterns of correlation in the data" (Lattin et al., 2003, p. 171). CFA is able to assess if the construct has convergent validity, or if it measures what is intended to be measured with multiple items. CFA is also used to analyze the differences between two constructs. Validity is evaluated based on the goodness-of-fit tests. Reliability is analyzed in CFA through squared-factor loading in the model.

Fig. 1 represents the proposed model, which integrates manufacturing and marketing integration, manufacturing priorities and business performance. The analysis was based on three dimensions: reliability, unidimensionality and convergent validity. We analyzed the constructs through CFA using the statistical software package AMOS 6 (Table 3). Fig. 1 presents the variables related to the strategic integration scale. I1, I2 and I3 items measure manufacturing and marketing integration. OP1, OP2, OP3 and OP4 items are related to managerial priorities. Finally, BP1, BP2 and BP3 items evaluate business performance. All the Vn included in the model are measurement errors. The questions are listed in Appendix A.

Table 3
General statistics for goodness-of-fit.

Stand alone indices	
Chi-square	36.212
Degrees of freedom (df)	32
Probability level	.669
Goodness-of-fit (GFI)	.932
Adjusted goodness-of-fit (AGFI)	.883
Standardized RMR	.063
RMSEA	.037
Incremental indices	
Normed fit index (NFI)	.853
Incremental fit index (IFI)	.980
Comparative fit index (CFI)	.979
Tucker–Lewis coefficient (TLI)	.971

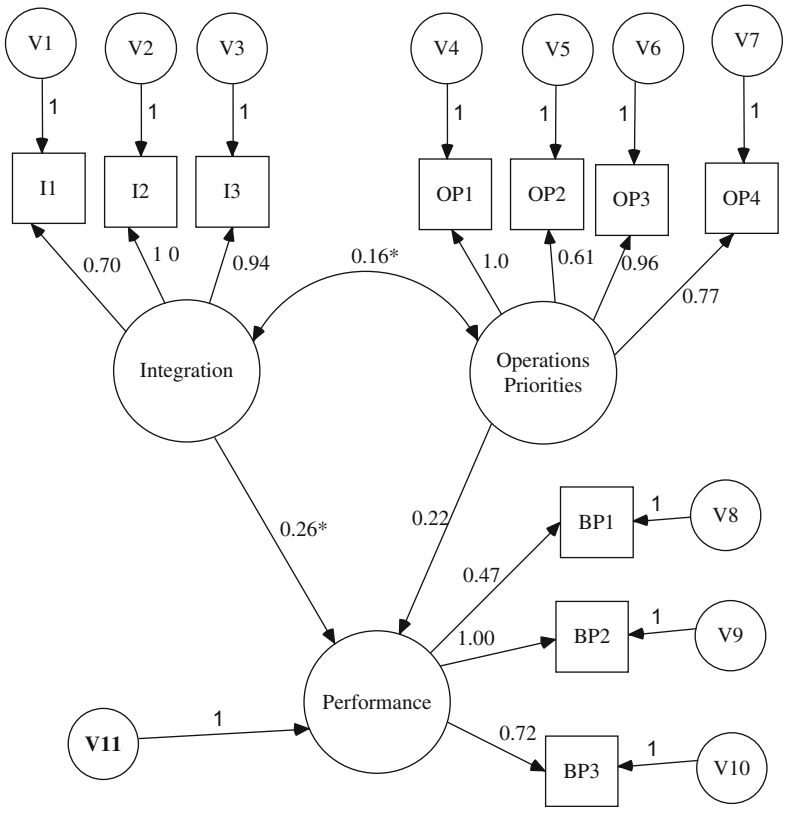

Fig. 1. Manufacturing and marketing integration, managerial priorities and company's performance model. *Significant at $p < .10$.

Table 4
. Results of confirmatory factor analysis test of measurement scale discriminant validity.

Construct scale pairs		Unconstrained χ^2	df	Constrained χ^2	df	χ^2 Difference
Mkt. Manufac. integration	Operations Priorities	14.3	13	58.1	14	43.8*
Operations priorities	Business performance	11.0	13	59.3	14	48.3*
Mkt. Manufac. integration	Business performance	13.0	8	45.0	9	32.0*

* Significant at $p < .01$.

Table 5
Tests of invariance of path model across calibration and hold-out (baseline) samples.

	H_{form}
Chi-square	44.31
Degrees of freedom (df)	32
Probability level	.10
Goodness-of-fit (GFI)	.89
Adjusted goodness-of-fit (AGFI)	.80
Standardized RMR	.07
RMSEA	.08
Incremental indices	
Normed fit index (NFI)	.73
Incremental fit index (IFI)	.90
Comparative fit index (CFI)	.90

Goodness-of-fit tests used included Goodness-of-Fit Index (GFI), Comparative Fit Index (CFI) and Normed Fit Index (NFI) current recommendable values (above .90). GFI is a measure of absolute fit, which determines the degree to which the overall model predicts the observed covariance or correlation matrix (Hair et al., 2005). CFI and NFI are incremental fit measures, which compare the proposed model to a baseline model, referred as the null model (Hair et al., 2005). All these measures range from 0 to 1.0 and higher values indicate better fit. On the other hand, Root Mean Square Error of Approximation (RMSEA) and Root Mean Residual (RMR) are absolute fit measures where lower values are better.

The model presents a chi-square equal to 16.74 and the probability level is insignificant, as expected. The low chi-square value leads to significant levels, which indicates that there is no significant difference between the actual and predicted matrices (Hair et al., 2005). All the factor loadings are above .50, which indicates a satisfactory level of construct reliability. Nevertheless, we may mention that one item in the performance construct presents a factor loading equal to .47, which recommends some caution in the results analysis (Lattin et al., 2003).

The chi-square difference tested the discriminant validity between the scales (Anderson and Gerbing, 1988; Ahire et al., 1996; Stratman and Roth, 2002). Using the usual procedure of fixing the correlation for the three pairs of scales, the models showed statistically significant differences. Considering that the scales were manufacturing and marketing integration, managerial priorities and business performance, the results showed that the constructs are different among themselves. Thus, the results suggest that the scales present acceptable levels of validity and reliability (Table 4).

We tested the form invariance (H_{form}) between the two industries (calibration and hold-out samples) for the proposed model presented in Fig. 1. The calibration sample (machinery industry) presented a chi-square equal to 44.31 and $p < .10$. The fit measures such as GFI, IFI and CFI have satisfactory values (around .90). Similar results were found for the hold-out sample (food industry). Therefore, this result suggests that both samples present the same form (i.e. the null hypothesis of same form cannot be rejected) (Table 5).

10. Common method variance

As the same respondent was the source for all of the variables (predictors and criterion), there is a clear potential presence of common method variance (CMV) (Podsakoff et al., 2003). We used two ways to control and test the existence of CMV in the data. To control the CMV biases we followed two aspects: the respondent was anonymous and we used a different format for the predictor and criterion measures (Podsakoff et al., 2003). Complementarily, we used a procedure recommended by Widaman (1985) and applied by Carlson and Kacmar (2000). We included a single method factor in the model and analyzed its impact on the measures fit and on the total variance. The method factor inclusion improved the fit measures but accounted for only 1.5% of the total variance, far less than the 11% found by Carlson and Kacmar in their study. Therefore, we may state that CMV is not a pervasive problem in this study.

11. Mediator variable

According to MacKinnon et al. (2002, p. 100), "tests of intervening variables are useful because they examine processes by which variables are interrelated." The inclusion of a variable indicates that it may or may not affect the proposed model. In this case, we included a variable related to the firm size. We expected that higher levels of cross-functional integration and multiple competitive criteria in managerial priorities are related to firm size.

We tested the model including the firm size variable and evaluated the effects of this inclusion. Thus, firm size was the mediator variable. Therefore, we tested if manufacturing and marketing integration and managerial priorities in multiple criteria were influenced by the size of the firm. According to Baron and Kenny (1986) a mediator variable highlights the importance of a process that intervenes between the inputs and outputs. The model in Fig. 2 is still robust if we consider the statistics for goodness-of-fit. As discussed previously, GFI, CFI, NFI, RMR and RMSEA are in the expected values (Table 6).

We fixed the paths that link the exogenous variables (manufacturing and marketing integration and managerial priorities) to the endogenous variable (business performance) through the mediator variable (size). According to Kline (2005, p. 52), "indirect effects involve one or more intervening (or mediator) variables that 'transmit' some of the causal effects of prior variables onto subsequent variables." Table 7 presents the direct and indirect effects in the model with the mediator variable (firm size).

According to Baron and Kenny (1986), a strong indication of mediation would present if the direct path is no longer significant when the indirect paths are controlled. In this case, the regression weights related to the endogenous and exogenous variables become insignificant when all the paths are fixed with one value. Therefore, even though the first model (without the mediator variable) is statistically significant the second model allows a more complete view of the relationship between the exogenous and endogenous variables. Thus, business performance is still related to manufacturing and marketing integration and

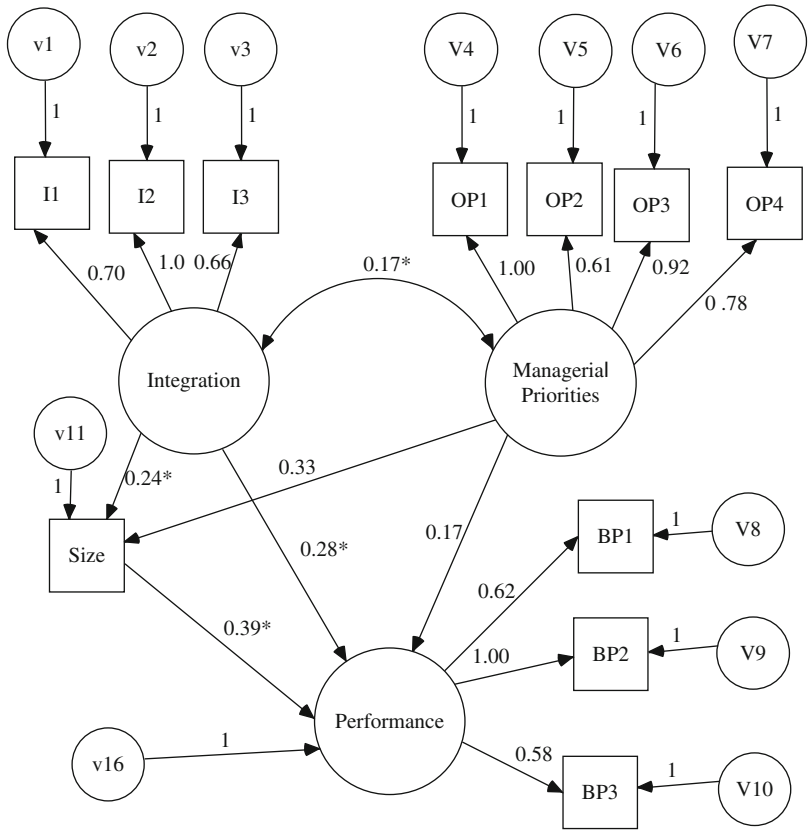

Fig. 2. Manufacturing and marketing integration, managerial priorities and company's performance model with a mediator variable. *Significant at $p < .10$.

Table 6
General statistics for goodness-of-fit for model with mediator variable.

Stand alone indices	
Chi-square	45.858
Degrees of freedom (df)	39
Probability level	.21
Goodness-of-fit (GFI)	.92
Adjusted goodness-of-fit (AGFI)	.87
Standardized RMR	.06
RMSEA	.04
Incremental indices	
Normed fit index (NFI)	.83
Incremental fit index (IFI)	.97
Comparative fit index (CFI)	.97
Tucker–Lewis coefficient (TLI)	.96

Table 7
Effects of exogenous and prior endogenous variables on model constructs ($n=99$).

Variable	Managerial priorities		Integration manufacturing and marketing		Firm size	
	Direct	*Indirect*	*Direct*	*Indirect*	*Direct*	*Indirect*
Firm size	.331	.000	.241	.000	.000	.000
Business performance	.107	.130	.284	.095	.394	.000

managerial priorities when we include the firm size as a mediator factor. In other words, we may state that according to the proposed model firm size influences the relation between manufacturing and marketing integration, managerial priorities and business performance. Fig. 2 presents the same proposed model as Fig. 1 with the inclusion of the mediator variable.

Finally, Table 7 presents the direct and indirect effects in the proposed model (Fig. 1). The term "direct effect" quantifies an influence that is not mediated by other variables in the model. On the other hand, indirect effects are the difference between total and direct effects.

12. Results

The results confirm Hypothesis 1. Manufacturing and marketing integration is positively correlated to the managerial orientation in multiple competitive criteria (covariance=.16, $p < .10$). In this case, the result shows a close relationship with the cumulative capabilities approach (Ferdows and De Meyer, 1990). Therefore, the results suggest that higher performance in simultaneous competitive criteria is a goal for companies that seek to integrate their functional areas internally. In this specific case, manufacturing and marketing would be the key functions in order to accomplish high performance in the four basic competitive criteria.

On the other hand, manufacturing and marketing integration is positively related to business performance (correlation=.26) and presents statistically significant results ($p < .10$). Thus, Hypothesis 2 is confirmed. This is an expected result that several studies have shown in recent decades. Possibly, companies in the sample with high performance are adopting advanced manufacturing technologies and developing cross-functional activities in order to achieve new performance patterns. Lean systems or micro-electronics-based equipments are able to lead to high levels of performance in quality, cost and flexibility concurrently.

Hypothesis 3 is partially confirmed because the result is not statistically significant (correlation = .22, $p > .10$). Companies with manufacturing managers seeking a high performance in the four competitive criteria presented a higher business performance in the sample. Even though other studies have widely explored this relationship between competences and business performance, including Flynn and Flynn (2004), this is an expected result based on the cumulative capabilities approach. Therefore, the results suggest that this managerial orientation is a possible characteristic of high-performance companies.

Finally, it is worth discussing the role of the mediator variable. The results suggest that large companies are more capable of integrating manufacturing and marketing areas and achieving high performance in multiple competitive criteria. This finding agrees with the common sense concept that large companies usually have more resources to invest in capabilities development based on cross-functional integration. Small companies possibly do not need a special effort to integrate their functional areas because the areas are physically closer than in a large company, and they have a centralized decision process. Regarding the competitive criteria, Porter (1986) also emphasized that generic business strategy for small companies should be focused in specific niches. Thus, a sharp focus on one or a few specific competitive criteria is more coherent with a niche strategy.

13. Conclusions

The results suggest that when manufacturing management is concerned with achieving high performance in multiple competitive criteria, manufacturing and marketing seeks more integration. The results are consistent with the cumulative capabilities approach. In this way, manufacturing and marketing will have shared goals in the most competitive companies. Despite these results, the cumulative capabilities approach is not at a consensus in the operations management research. Authors such as Boyer and Lewis (2002) showed that trade-offs are identifiable in some processes. Others such as Flynn and Flynn (2004) argued that the original sequence based on Ferdows and De Meyer (1990) is not the same for all countries.

Performance is positively related to manufacturing and marketing integration and managerial orientation. These results are consistent with the literature on manufacturing and marketing integration. In recent decades different authors have stated that this aspect is a key element for business performance. Therefore, the results suggest that companies achieve better results when manufacturing and marketing work together. Nevertheless, there are historic barriers between manufacturing and marketing. Cultural differences, evaluation systems without integration and biases in the strategic view are potential problems when manufacturing and marketing attempt to work together.

As managerial implications from this study we may mention the need to increase integration between manufacturing and other functional areas, such as marketing and R&D. We claim that this type of integration is characteristic of the most competitive companies in the sample. Therefore, these companies are seeking to achieve high performance in cost, quality, delivery and flexibility concurrently. Current efforts in lean manufacturing and other technologies such as flexible manufacturing systems are practical examples of how integration efforts may lead to new performance patterns.

The inclusion of a mediator variable related to firm size suggested that large companies are better suited to achieve high performance in multiple competitive criteria than small companies. This is an expected result according to the proposal of world-class manufacturing and cumulative capabilities. It is worth mentioning that these two approaches present clear connections.

These results are related to samples from an emerging economy. Thus, the performance variable related to exports growth is possibly more relevant to companies located in countries that are seeking to increase their participation in global markets. In a similar situation we may mention countries such as China, India and South Africa, among others. Regarding the focus on only two industries, we may mention that food and machinery represent different dynamisms in the Brazilian economy as measured by physical production growth (IBGE, 2008). Food is considered an industry with low dynamism while machinery is an industry with a high level of dynamism. As the proposed model was considered valid for both industries, the results suggest that the model might also be valid for other industries with different levels of dynamism.

Finally, the sample size and focus on two industries are two clear limitations of this study. Therefore, we emphasize that all of the results require caution when considering these aspects. Future research may explore other performance measures for business performance and manufacturing performance. Other industries may also be analyzed in order to test these results. A test of the same constructs in other countries, such as traditional industrialized countries or emerging economies like China or India, is an opportunity for further study.

Appendix A. Questions

I1 – Indicate how often manufacturing develops joint activities with marketing in order to develop new products/services.

I2 – Indicate how often manufacturing develops activities in order to improve its coordination with marketing.

I3 – Indicate how often manufacturing develops cooperative activities for problem solving with marketing.

P. Indicate which are manufacturing managerial priorities.

1. Manufacturing costs.
2. Product conformity to the project specification.
3. Capability for quick new production introduction.
4. Manufacturing lead-time reduction.

Scale

Unimportant	Modestly important	Sometimes	Important	Highly Important
1	**2**	**3**	**4**	**5**

BP1. Which is the company's profitability in the last year?

Negative	1
Equal to zero	2
Less than 5%	3
5–10%	4
More than 10%	5

BP2. The sales improvement in the last three years was:

More than −20%	Less than −20%	Stable	Less than +20%	More than +20%
1	2	3	4	5

BP3. The rate between exports and total sales is:

Equal to 0%	Less than 10%	11–30%	31–50%	More than 50%
1	2	3	4	5

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