ESTRATÉGIA

STRATEGIC ALIGNMENT THROUGH COMPETITIVE PRIORITIES IN CAPITAL GOODS COMPANIES

ALINHAMENTO ESTRATÉGICO POR MEIO DE PRIORIDADES COMPETITIVAS EM EMPRESAS DE BENS DE CAPITAL

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ABSTRACT

The purpose of this paper is to ascertain the strategic alignment of companies producing capital goods and deploying competitive priorities, from the standpoint of dyadic relationships. To collect the data, semi-structured questionnaires were used for a sample consisting of 113 respondents from 87 companies producing capital goods, all operating in Brazil. The data were analyzed using non-parametric statistical techniques. More specifically, an analysis of Kendall's coefficient of concordance (W) showed that product (or component) price and performance are the main competitive priorities for companies in this sector. Thus, evidence was found that companies producing capital goods are strategically aligned from the standpoint of dyadic relationships with their suppliers and customers, with price being the main criterion, depending on the downstream focus of the company, through the performance of the product (or component).

KEYWORDS

Strategic Alignment. Competitive Priorities. Capital Goods. Supply Chain Management. Order Winning Criteria.

RESUMO

Este artigo tem por objetivo verificar o alinhamento estratégico, por meio das prioridades competitivas sob a perspectiva de relacionamento diádico, das empresas de bens de capital. Para a coleta de dados, foram usados questionários semiestruturados aplicados em uma amostra composta de 113 respondentes, de 87 empresas de bens de capital, atuantes no Brasil. Os dados foram analisados por meio de técnica estatística não paramétrica. Em particular, a análise do coeficiente de concordância de Kendall (W) revelou que o preço e o desempenho do produto (ou componente) são as principais prioridades competitivas das empresas do setor. Foram encontradas evidências, portanto, de que as empresas de bens de capital estão alinhadas estrategicamente, sob a perspectiva de relacionamento diádico com seus fornecedores e clientes, tendo o preço como principal critério, seguido à jusante da empresa foco, pelo desempenho do produto (ou componente).

PALAVRAS-CHAVE

Alinhamento Estratégico. Prioridades Competitivas. Bens de Capital. Gestão da Cadeia de Suprimentos. Critério Ganhadores de Pedidos.

INTRODUCTION

Capital and technology intensity are major barriers hampering the inflow of new competitors in the capital goods manufacturing sector, allowing incumbent companies to retain control over supply chain governance and establish strategies slanted towards products or sales (GEREFFI, 2001). Nevertheless, as competition becomes increasingly fierce, many manufacturers are now starting to realize that they must restructure themselves to ensure sustainable growth by considering approaches directed towards either markets or customers (CHRISTOPHER; TOWILL, 2001).

With this new paradigm, companies must react rapidly to the surrounding dynamics, ensuring that they are aligned with their suppliers and customers in a joint quest for better competitive positions. Chopra and Meindl (2001) and Handfield and Nichols Jr. (1999) have acknowledged the importance of firms looking outside organizational boundaries when analyzing how they are aligned with their customers and suppliers.

In this context, the most common type of alignment analysis has been through supply chain management, considered as a part of the value chain (PORTER, 1985). Value chain optimization is achieved through the proximity at equal density of the dyads structured between suppliers and the hub company, and the hub company and its customers (ANDERSON *et al.*, 1994; HARLAND, 1996). The number of dyad relationships established around the hub company or benchmark company depends on the complexity of the products (LAMMING *et al.*, 2000). For example, the number of dyads surrounding a company that manufactures electronic

products is higher than that of a company manufacturing fruit juice.

With competition rising more quickly among corporate groups or chains than among individual companies (BARNEY; HESTERLY, 1996), competitive priorities have become particularly noteworthy as an important element of strategic alignment (SKINNER, 1969, HILL, 1980, FERDOWS; DE MEYER, 1990, CHOPRA; MEINDL, 2001) to coordinate and integrate the production processes of the hub company with its customers and suppliers.

Thus, there is a current need for studies that foster academic and scientific progress and consider the perceptions of managers regarding the strategic alignment of companies, with dyads as the units of analysis. The dyad relationship, meaning the relationships between nearby companies and competitive priorities, must also be guided by the quest for appropriate strategic alignment.

In this study, strategic alignment constitutes the foundations of the methodology used, with its relevance assessed through a sample of managers at Brazilian companies that manufacture capital goods. Using the perceptions of strategic alignment among these managers, we develop a methodology using Kendall's coefficient of concordance (W) to assess the level of alignment between a hub company and its suppliers and customers.

The methodological gap perceived in strategic alignment has prompted an interest in understanding and seeking explanations for daily routines related to the alignment experienced and perceived by the supply chain managers of companies that manufacture capital goods. Within this context, the research question arises (in terms of the perceptions of these managers) of whether companies that manufacture capital goods with businesses in Brazil are strategically aligned with their suppliers and customers according to their competitive priorities. The purpose of this research is thus to ascertain the level of supply chain alignment from the perspective of dyadic relationships (HARLAND, 1996). Studies on strategic alignment represent important contributions to the literature on strategy. Although several studies have already been conducted on this topic, additional studies are still required, especially with regard to the articulation of strategic management processes in turbulent environments, which is typified by the Brazilian context.

This paper is structured as follows: Section 2 presents a review of the literature, discussing aspects of strategic alignment and underpinning the structure of the study. Section 3 presents the methodological procedures, followed by Section 4 that presents data analysis and discusses the findings. Finally, Section 5 discusses the main conclusions drawn from this research and provides suggestions for subsequent studies on this topic.

REVIEW OF THE LITERATURE
Strategic Alignment

The literature presents several approaches or conceptual frameworks for addressing strategic alignment to create value. In the field of organizational theory, authors such as Burns and Stalker (1961), Lawrence and Lorch (1967), Chandler (1962), Teece *et al.* (1997), Barth (2003) and Venkatraman (1989) are particularly outstanding. For production and operations management, the approaches suggested by Chopra and Meindl (2001),

Brown and Blackmon (2005), Griffis *et al.* (2007), Vachon *et al.* (2008) and Swink *et al.* (2007) are noteworthy. Through a mixed approach focused on the environmental context, and intra-organizational processes, manufacturing and resources, the adaptive cycle model, developed by Miles and Snow (1978), stands out, as does the Balanced Scorecard model, developed by Kaplan and Norton (2006).

Each approach suggests an analysis mechanism that is designed to create value through ensuring the sustainability of competitive advantages. However, as mentioned in the argument presented by Hitt *et al.* (2001), no single approach may be rated as overwhelmingly superior to the others. The adaptation of each approach to strategic alignment depends not only on the possibilities arising from the resources and capabilities inherent to the company but also on the opportunities and threats appearing in the external environment.

More specifically, according to Gaither and Frazier (2001), the use of resources and production capabilities by manufacturing companies is of vital importance for ensuring competitive advantages. Thus, the main ways in which resources are directed toward underpinning the feasibility of business strategies involve the adoption of new production arrangements that streamline and speed up the processing side or enhance product quality. Installed capacities may affect the internal environment in various areas within the company, such as the choice of new processing technologies, new product development and personnel management. However, corporate dynamics require coordination with other functional areas of the company, such as marketing, finance and human resourc-

es, for the strategies to be compatible and lead to positive outcomes. Nevertheless, it should be emphasized that manufacturing and operations strategies must be aligned with competitive environments and coordinated through corporate strategies, which must, in turn, be compatible with the demands of target customers, while keeping pace with market conditions and trends (WARD; DURAY, 1995).

Hill (2000) suggests aligning production resources and capabilities with market needs, by distinguishing among order winning criteria and order qualifying criteria. The order winning criteria are represented by factors that obtain orders on the market, snatching them away from the competition, while the order qualifying criteria are associated with factors or levels that the company must attain merely to continue operating on the market (HILL, 2000). It is important to highlight that, due to market dynamics, both the order winning criteria and the order qualifying criteria may alter over time (BROWN *et al.*, 2005).

Thus, an ongoing, dynamic assessment of the order winning and order qualifying criteria is required. Furthermore, the order qualifying and order winning criteria may be accompanied by less important criteria that do not influence customers decisively, but might be applicable to certain production activities, or whose importance may alter over time, ranging from secondary to a primary priority.

From the management standpoint, once the order winning and order qualifying criteria have been identified, according to how relevant these criteria are rated by customers, a screening and selection process begins, tailored to corporate capabilities and strategies, as well as businesses,

to steer the competitive priorities of the company. Using the sand cone model metaphor, Ferdows and De Meyer (1990) portray the fine-tuning of manufacturing activities through competitive priorities related to quality, reliability, speed of deliveries, flexibility and cost.

Thus, for Ferdows and De Meyer (1990), competitive priorities, also called the order winning criteria (HILL, 1980) or core competencies (SKINNER, 1969; HAMEL; PRAHALAD, 1995), now become key factors for the establishment of an operation strategy that allows value to be created for the customers (CHASE *et al.*, 2004). Within this context, Boyer and Lewis (2002) suggest that the competitive priorities are key elements for the decision-taking process among administrators in the operations area.

It is important to stress that the competitive priorities taken into consideration by Ferdows and De Meyer (1990) are not undeniably order winning criteria. For example, Christopher and Towill (2001) establish the agility variable as a competitive priority, typified by fast responses, while Stalk Jr. (1988) takes time into consideration. In other words, the ways in which companies manage time on the production and development sides (for launching new products, sales and distribution) constitutes a major comparative advantage in terms of their competitiveness.

Finally, it is important to stress that the various competitive priorities may be difficult to attain simultaneously. Should incompatibilities occur among competitive priorities involving resources and capabilities, management must assess the costs and benefits involved, as well as considering potential trade-offs.

Proposed Framework

The basic assumption underlying strategic alignment is that no operation or any part of an operation can exist in isolation and that if some part of an operation underperforms, it then downgrades the efficacy of the entire supply chain. Within this context, Slack *et al.* (2002) divide supply chains into three tiers: total, immediate and internal. For the total supply chain, an individual operation is managed in a way that involves all the companies in the supply chain, from the raw material supplier to the end consumer; in an immediate supply chain, an operation is managed from the standpoint of the dyadic relationship between the hub company and its suppliers and customers (SLACK *et al.*, 2002). An analysis of the dyadic relationship leads to an understanding of the links between suppliers and buyers at different points along the supply chain. It should be noted that gathering information at the dyadic level ensures easier visualization, understanding and management (HARLAND, 1996). Finally, considering the operation *per se,* the internal supply chain tier involves the flow of materials and information that takes place in the departments, cells or operating sectors of a given company (SLACK *et al.*, 2002).

Among the various tiers, the immediate supply chain tends to be the most important for most companies, as it requires relationships among different companies, meaning that it is longer than the internal chain, although not as integrated as the total chain. The implementation of supply chain management strategies also faces challenges. For instance, factors such as different production speeds or poor alignment among the companies in the chain may result in undesirable variations

in inventories or uncertainties in demand, frequently associated with a bullwhip effect (LEE *et al.*, 1997). To surmount difficulties in implementing strategies, managers must control organizational structures and supply chain governance.

Thus, in technology and capital-intensive sectors, manufacturers tend to maintain control over supply chain operations. In contrast, in sectors where the costs of information, product design, advertising and distribution management systems raise major barriers to the inflow of companies, supply chains tend to be governed by buyers (GEREFFI, 2001).

Given new business models, traditional function-type administration has begun to focus on process management. For Bowersox et al. (2002), integrated process management is underpinned by compensatory exchanges, meaning trade-offs among functions, to achieve the lowest costs throughout the entire process, instead of minimizing the costs of each function in the process (BOWERSOX *et al.*, 2002).

Therefore, according to Hill (1980), who established that immediate supply chain man-

agement must have an alignment of order winning criteria multiples, a theoretical model is built up as demonstrated in Figure 1.

This theoretical model expresses the alignment of the order winning criteria (N_i, $i = 1$ to n) in three links (k_j, $j = 1$ to 3) of the chain, consisting of suppliers, the hub company and the customers (or users of capital goods). The methodological procedures were drawn up to test whether the order winning criteria adopted by the hub company and its immediate customers and suppliers are independent or not.

METHODOLOGY

To ascertain alignment from the standpoint of the dyadic relationships of the order winning criteria, associated with competitive priorities, an exploratory study was conducted using a non-random sample of companies producing capital goods in Brazil. Although characteristics of the sample preclude the generalization of results, the study suggests a method of measuring the alignment between a hub company and its suppliers and customers. In the bibliographic survey, several criteria were

Figure 1 - Theoretical model of dyadic relationship

Source: The authors.
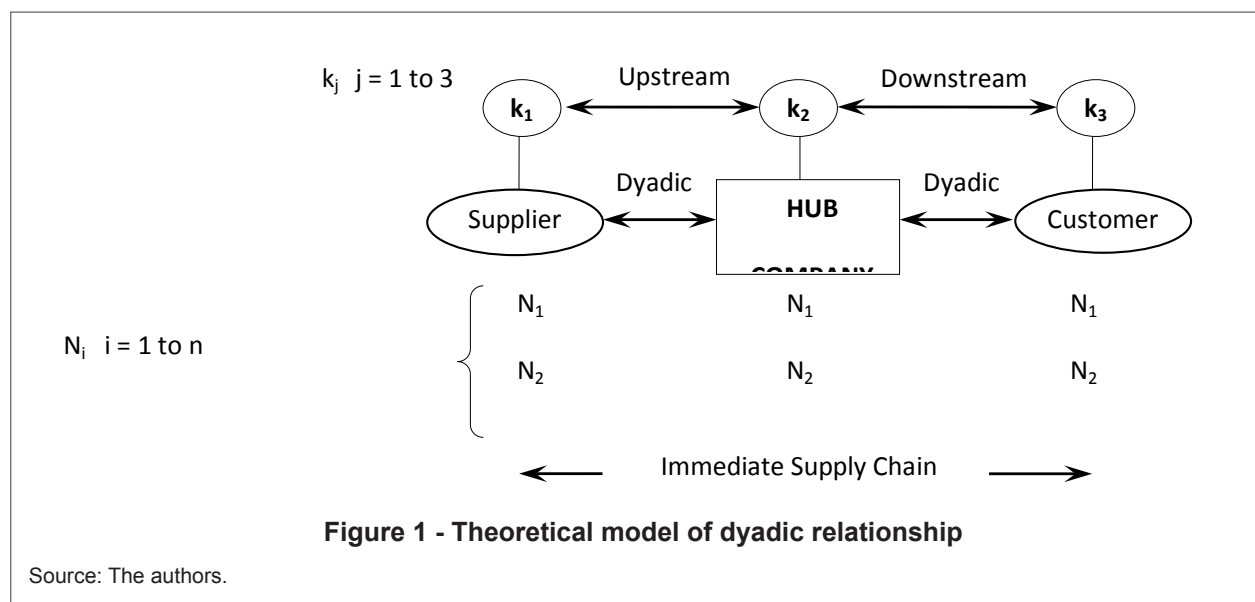
identified that were ranked as order winning. Disregarding some overlap or redundancies of similar items, a list of surveyed benchmark criteria was submitted to the professional staff of eight companies to validate its content. Thus, after several modifications and mergers suggested by these professionals, as well as after pre-testing the contents with other professionals in the sector, a set of ten relevant criteria was established with their respective data codes: flexibility of delivery date (N_1), price (N_2), speed of delivery date (N_3), reliability of delivery date (N_4), flexibility of contract alterations (N_5), compliance with standards (N_6), compliance with project design (N_7), performance (N_8), reliability of product or component (N_9) and flexibility of technical alterations (N_{10}). The remaining criteria were grouped under Others (N_{11}).

Next, a semi-structured questionnaire was developed; it consisted of three sections to be completed by the managers of companies that were linked to the value chain in the capital goods sector. The first section of the questionnaire covered the basic data of the respondent, including name, job, and time with the company and academic qualifications. The second section focused on corporate characteristics and collected information such as the name and field of activity of the company, the type of output, the number of employees and the revenue. It must be stressed that the potential respondents to this survey were advised that the data would kept confidential and that the names of the respondents and the companies need not be entered to ensure non-disclosure. This procedure was intended to reduce possible distortions in the data survey.

The third section of the questionnaire

consisted of three questions and focused on the order winning criteria that the respondent believed were considered by customers when making decisions on purchases. The first question asked the respondent to list, in order of importance, four criteria that are considered to be order winning criteria among the ten criteria defined above. Only four criteria were was because a company cannot be competitive in several criteria. To be competitive, a company must select its own order winning criteria or competitive priorities (SKINNER, 1969; BOYER; LEWIS, 2002; FLYNN; FLYNN, 2004; PAIVA *et al.*, 2009).

For the second question in the third section, the respondent was asked to assess the weight of the four criteria listed in order of importance in the first question. To assess the order winning criteria, the respondent was asked to assign a value between 10% (optional for making a decision) and 100% (necessary for making a decision) to each of the previously selected criteria. The assessment of the order winning criteria by weight of importance for making decisions was intended to do the following: a) to ascertain whether, in procurement decisions, the company considered the presence of the necessary criterion; and b) to serve as tie-breaking parameter should the criteria obtain the same number of responses.

Initially, the arithmetic mean $w_m(i)$ $w_m(i)$ was calculated for the weight assigned to the each ii of the first four order winning criteria, as shown in Equation 1.

$$w_{m,k}(i) = \frac{1}{q_k(i)} \sum_{j=1}^{q_k(i)} w_{j,k}(i)$$

where

$w_{m,k}(i)$: arithmetic mean of the weights $w_j(i)$ assigned to the i-th, $i = 1, \ldots, 10$, criterium by respondent j as the k-th, $k = 1, \ldots, 4$, most important order winning criterium

$q_k(i)$: total number of respondents that ranked the i-th order a winning criterium, ranked among the first k, $k = 1, \ldots, 4$, criteria

Subsequently, the average weights were calculated assigned to the four main, $k = 1, \ldots, 4$, order winning criteria, weighted by response frequencies, as shown in Equation 2.

$$w_p(k) = \frac{1}{\sum f_i(k)} \sum_{i=1}^{N} w_{i,k}(k) f_i(k)$$

where

$w_p(k)$: average weight attributed to the k-th order winning criterium, weighted by response frequency

$f(i)$: response frequency of the i-th order winning criterium

n: total number of order winning criteria

Thus, the average weighted contribution of the criteria by order of importance was obtained, taking into consideration the involvement of the top four order winning criteria.

A final open-format question was included, asking the respondent to mention any other order winning criteria considered important but not included in the list of criteria presented in the questionnaire guide.

To obtain a homogenous sample that would be less open to the variabilities imposed by different sectors, an attempt was made to collect data in companies belonging to the capital goods sector supply chain, corresponding to Group 29 in the National Economic Activities Classification, established by the Brazilian Institute for Geography and Statistics (IBGE, 2008). To conduct the interviews, a snowball technique was used, in which the first respondents in the hub companies were requested to list their main suppliers and customers, and then so on successively (MALHOTRA, 1999).

Thus, questionnaires were sent out to supply chain managers (dyadic) to collect the data, such as sales, procurement, production and logistics. These managers were then also requested to list their most important suppliers and customers, noting that neither the suppliers nor the customers necessarily needed to fit into Group 29 of the National Economic Activities Classification. This approach was intended to ensure parity between hub companies and their suppliers and companies. The descriptions of the order winning criteria and the questions on the order winning criteria are presented in Appendix A.

Given the methodology used, the survey concept was transversal, meaning that the replies to the questionnaire were limited to the perceptions of the respondent at that time. A limitation of this study is its use of a comparative ordinal scale, meaning that it was not possible to measure whether, for example, the importance assigned to the top-rated criterion was near or far from the importance of the criterion rated second. This scale thus allows for the identification of whether a criterion is assigned a greater or lesser degree of importance than another order winning criterion, but does not reflect the magnitude of the differences in importance assigned to these criteria.

For the statistical analysis, Kendall's coefficient of concordance (W) was used. Thus, although the ordinal scale used in the questionnaire undermines statistical tests based on assumption of normality of probability distribution of measured variables, it was possible to calculate the correlation coefficient between two metric variables through classification or ranking. In this context, with k_i as the set of positions(s) or (links) and N_i as the object (or the order winning criteria), according to Siegel (1956), the association among them can be measured using Kendall's coefficient of concordance (W).

ANALYSIS OF DATA AND FINDINGS

The sample consisted of 87 companies with 113 respondents: 42 respondents from supplier companies; 20 from hub companies and 51 from customer companies. The data were collected in 2008, with the important characteristics of the sample described below.

Profile of Respondents and Companies

For the interviews conducted with managers linked to supply chain management, 78% of the respondents held university degrees in business administration and engineering, and they held many different positions, including Procurement, Logistics, Quality and Production, showing that supply chain management activities are broad-ranging. In terms of the basic positions held by these professionals, 53% of them were supervisors, managers, directors or officers. The remaining 47% held technical positions, such as engineers, buyers and logistics and supply chain coordinators. In terms of length of time in the position and with the company, 61.1% and 69.6% of the respondents had been there for more than five years, reflecting the low labor force turnover in this sector in Brazil.

The sample presented a concentration of companies and respondents in the São Paulo municipal area with 51% and 59% of the total replies, respectively. It is important to note that São Paulo is Brazil's economic powerhouse, meaning that many of the companies producing capital goods are found in this region. Regarding the size of the companies in the sample, according to the ranking drawn up by Brazil's National Social and Economic Development Bank (BNDES, 2008) and the Brazilian Small Business Bureau (SEBRAE, 2008), 53% of the total were major corporations, 36% were medium-sized enterprises and 11% were small businesses. The main types of output for the companies in the sample were based on serial production and made-to-order, at 24% and 53%, respectively.

In general, the respondent profile consisted of a highly qualified work force with low turnover, with respondents spending several years in their companies. The firms in the sample in general may be characterized as being major corporations with made-to-order output located in the São Paulo Metropolitan Region.

Alignment of the Order Winning Criteria

An analysis of the collected data and the discussion of the findings on the dyadic alignment among companies in the supply chain are presented below.

Descriptive Statistics

Using the response frequency percentage, the arithmetic mean and the weighted

average of the weights assigned to each order winning criterion, Table 1 summarizes the rank findings for the order winning criteria and the average weights assigned by the respondents.

There are several key observations based on Table 1. a) Price posted the highest response frequency for the three links, k_1, k_2 and k_3, with values of 10, 6 and 19, respectively. Thus, price may be considered as the main order winning criterion among manufacturers of machines and equipment, as well as among their suppliers and customers. b) The arithmetic means of the weight ($w_m w_m$) for price in the three links,

k_1, k_2 and k_3, were the same at 0.37, 0.68 and 0.45, respectively. In percentage terms, these values indicate the possibility of replacing the main order winning criterion (price) by another criterion. c) In general, the substitution of the main order winning criterion by another in the links k_1, k_2 and k_3, was 0.35; 0.37 and 0.40, respectively, as may be noted through the average weights assigned to the criteria, weighted by response frequency ($w_p w_p$).

Table 2 presents the order winning criteria selected by the respondents in first, second, third and fourth places, together with the respective links (k_1, k_2 and k_3).

TABLE 1 - Response Frequency (f), Arithmetic Mean (wm) and Weighted Average (wp) of the Weights Attributed to the Order Winning Criteria

ORDER WINNING CRITERIA			UPSTREAM (k1)				HUB COMPANY (k2)				DOWNSTREAM (k3)			
			1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
N_1	Flexibility of delivery date	f	5	5	2	3	1	3	2	0	7	4	4	3
		wm	0.28	0.26	0.15	0.23	0.26	0.25	0.18	0	0.34	0.21	0.08	0,13
N_2	Price	f	10	9	7	7	6	1	2	6	19	4	4	3
		wm	0.37	0.25	0.24	0.16	0.68	0.60	0.23	0.16	0.45	0.29	0.22	0,21
N_3	Speed of delivery date	f	8	4	10	6	5	2	3	0	1	6	2	9
		wm	0.34	0.27	0.22	0.24	0.25	0.10	0.17	0	0.40	0.18	0.13	0,16
N_4	Reliability of delivery date	f	1	5	8	6	1	3	1	1	4	6	12	5
		wm	0.40	0.24	0.18	0.19	0.40	0.27	0.20	0.26	0.48	0.27	0.20	0,17
N_5	Flexibility of contract alterations	f	0	0	2	1	0	1	0	1	0	1	1	4
		wm	0	0	0.21	0.10	0	0.20	0	0.20	0	0.30	0.23	0,09
N_6	Compliance with standards	f	2	3	2	4	1	0	0	2	1	0	4	6
		wm	0.39	0.26	0.26	0.19	0.40	0	0	0.23	0.70	0	0.25	0,18
N_7	Compliance with project design	f	2	6	3	0	4	1	1	0	2	5	4	2
		wm	0.33	0.28	0.25	0	0.20	0.10	0.10	0	0.45	0.27	0.18	0,10
N_8	Performance	f	5	5	2	4	0	5	5	2	11	8	4	4
		wm	0.39	0.28	0.25	0.20	0	0.25	0.15	0.25	0.30	0.28	0.14	0,12
N_9	Reliability of product (or component)	f	7	5	4	0	2	1	1	4	5	7	6	4
		wm	0.33	0.24	0.19	0	0.40	0.26	0.10	0.17	0.40	0.27	0.20	0,11
N_{10}	Flexibility of technical alterations	f	2	0	2	5	0	2	3	1	1	2	2	6
		wm	0.31	0	0.23	0.17	0	0.18	0.13	0.05	0.40	0.24	0.23	0,18
N_{11}	Others	f	0	0	0	3	0	1	2	1	0	0	3	2
		wm	0	0	0	0.20	0	0.10	0.10	0.10	0	0	0.15	0,18
Missing		f	0	0	0	3	0	0	0	2	0	0	1	2
Total Ac Frequency		f	42	42	42	42	20	20	20	20	51	51	51	51
Average weighted weights		wp	0,35	0.26	0.21	0.19	0.37	0.23	0.15	0.18	0.40	0.26	0.19	0.15

Source: Research data.

TABLE 2 - Order Winning Criteria – Supply Chain

ORDER	Upstream (k_1)			Hub Company (k_2)			Downstream (k_3)		
	Criterion		w_m	Criterion		w_m	Criterion		w_m
First	N_2	Price	0.37	N_2	Price	0.68	N_2	Price	0.45
Second	N_7	Reliability of project design	0.28	N_8	Performance	0.25	N_8	Performance	0.28
Third	N_3	Speed of delivery date	0.22	N_3	Speed of delivery date	0.17	N_4	Reliability of delivery date	0.20
Fourth	N_4	Reliability of project design	0.19	N_9	Reliability of product (or component)	0.17	N_3	Speed of delivery date	0.16

Source: research data.

First, the alignment noted in Table 2 is established by the order winning criterion (price), between the Supplier (k_1), Hub Company (k_2) and the Customer (k_3). Second, another important alignment is given by the order winning criterion (product or component performance), between the Hub Company (k_2) and the Customer (k_3) or downstream from the hub company. Moreover, one may emphasize the alignment given by the order winning criterion (speed of delivery date), between the Hub Company (k_2) and the Supplier (k_1) or upstream from the hub company.

In brief, price as an order winning criterion may be considered a competitive priority, as suggested by Skinner (1969) and Hill (1980). This priority may be deployed to underpin the strategic stance of the company, which, aligned with the available logistics and operating capabilities, can obtain the maximum efficiency from its production resources to service the users of its machines and equipment (customers).

Despite the findings of the descriptive statistics, it was necessary to ascertain whether these alignments were statistically significant; that is, whether they were not merely due to chance. To do so, additional analyses were conducted, as described below.

Kendall's Coefficient of Concordance (W)

In terms of the raw data presented in Table 1, collected through an ordinal scale, the following steps were taken: a) joint arrangements of the positions, with ties of the k_1, k_2 and k_3 links; b) the sum of the points (R_j); and c) the square deviations (d^2) calculated through the average of the sum of the points. Ranked by competitive priority in their respective links, the findings are presented in Table 3.

The data in Table 3 allow the Kendall's coefficient of concordance (W) test to be conducted for the first order winning criterion. Because there was a high proportion of ties in the points, tie correction was introduced in the calculation of the W calculation. The $AT = \frac{\Sigma(t^3 - t)}{12} T = \frac{\Sigma(t^3 - t)}{12}$ proof of the significance of W was influenced by the sample size. This led to the following two stipulations: a) for a small sample, the critical s value table must be used in Kendall's coefficient of concordance (W) for $3 \le k \le 20$ and $3 \le N \le$ in 7 at significant statistical levels of 0.05 and 0.01; b) for a large sample or $N > 7$, the following equation must be used [$\chi^2 = k * (N - 1) * W$] to determine the probability associated with the occurrence of a null hypothesis (H_0) for the ranking of the order winning criteria given by the respondents. The alternative hypothesis implies that the ranking of

winning criteria is not independent among links, suggesting agreement among raters of importance of the various criteria. The χ^2 (chi square) value may be obtained from the χ^2 critical values table (SIEGEL, 1956).

To prove the significance of W, a large sample was considered of N = 11 and k = 3, given by the following equation: $\chi^2 = k * (N - 1) * W$, with levels of freedom (gl.) = N - 1 = 10. Based on these data, the statistic $\chi^2_{Calc} = 22.236$ was obtained and, considering the chi square distribution, it was ascertained that this value was higher than the critical value of a 5% significance level. Thus, the null hypothesis was rejected, and therefore the ranking of the order

winning criteria given by the respondents would be different among the analyzed links. Using similar procedures to analyze the second, third and fourth order winning criteria, the findings presented in Table 4 were obtained.

In Table 4, it is noted that W was statistically significant at the 5% level for strategic alignment, from the standpoint of the dyadic relationship in the order winning criteria ranked first and second, with concordance levels equal to 0.741 and 0.633, respectively.

According to Siegel (1956), when W is significant, the best estimate of the real ranking of N order winning criteria is given by the order of the various sums of

TABLE 3 - Ranking, Sum of the Points (Rj) and Square Deviations (d2)

	Competitive Priorities	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}
FIRST	k_1 - Supplier	4.5	1	2	9	10.5	7	7	4.5	3	7	10.5
	K_2 - Company	6	1	2	6	9.5	6	3	9.5	4	9.5	9.5
	K_3 - Customer	3	1	8	5	10.5	8	6	2	4	8	10.5
	R_j: åk$_i$, i =1 to 3	13.50	**3.00**	12.00	20.00	30.50	21.00	16.00	16.00	11.00	24.50	30.50
	d²: [R$_j$ - (åR/N)]²	20.25	225.00	36.00	4.00	156.25	9.00	4.00	4.00	49.00	42.25	156.25
SECOND	k_1 - Supplier	4.5	1	7	4.5	10	8	2	4.5	4.5	10	10
	K_2 - Company	2.5	8	4.5	2.5	8	11	8	1	8	4.5	8
	K_3 - Customer	7	1	4.5	4.5	9	10.5	6	2	3	8	10.5
	R_j: åk$_i$, i =1 to 3	14.00	10.00	16.00	11.50	27.00	29.50	16.00	**7.50**	15.50	22.50	28.50
	d²: [R$_j$ - (åR/N)]²	16.00	64.00	4.00	42.25	81.00	132.25	4.00	110.25	6.25	20.25	110.25
THIRD	k_1 - Supplier	8	3	1	2	8	8	5	8	4	8	11
	K_2 - Company	5	5	2.5	8	10.5	10.5	8	1	8	2.5	5
	K_3 - Customer	5.5	2	9.5	1	11	5.5	5.5	5.5	3	9.5	8
	R_j: åk$_i$, i =1 to 3	18.50	10.00	13.00	11.00	29.50	24.00	18.50	14.50	15.00	20.00	24.00
	d²: [R$_j$ - (åR/N)]²	0.25	64.00	25.00	49.00	132.25	36.00	0.25	12.25	9.00	4.00	36.00
FOURTH	k_1 – Supplier	7.5	1	2.5	2.5	9	5.5	10.5	5.5	10.5	4	7.5
	K_2 - Company	10	1	10	6.5	6.5	3.5	10	3.5	2	6.5	6.5
	K_3 - Customer	9	6.5	1	4	6.5	2.5	10.5	6.5	6.5	2.5	10.5
	R_j: åk$_i$, i =1 to 3	26.50	8.50	13.50	13.00	22.00	11.50	31.00	15.50	19.00	13.00	24.50
	d²: [R$_j$ - (åR/N)]²	72.25	90.25	20.25	25.00	16.00	42.25	169.00	6.25	1.00	25.00	42.25

Source: Research data.

TABLE 4 - Kendall Test Findings (W)

ORDER	Average R_j	s = å[R$_j$ - (åR$_j$/N)]²	T_x	T_y	T_z	åT	W k = 3; N = 11	χ^2_{Calc} gl = N - 1 = 10	H_0 (α ≤ 0.05)
First	18.00	706.00	2.5	7	3	12.5	0.741	22,236	Rejected
Second	18.00	590.50	1	11	7	19	0.633	18,987	Rejected
Third	18.00	368.00	5.5	5	10	20.5	0.396	11,890	Not Rejected
Fourth	18.00	509.50	6	7.5	2	15.5	0.540	16,200	Not Rejected

Critical χ^2: gl = 10, α ≤ 5% = 18,307

Source: Research data.

the points (R_j). To some extent, the best estimate is associated with the minimum squares. Thus, in this study, the best alignment estimate for the order winning criteria ranked first went to the (N_2) criterion, following by the (N_8) criterion in second place.

Consequently, the findings presented in Table 4 allow some analyses. First, it may be considered that the concordance of the respondents in the three links analyzed (k_1 - supplier (k_1), capital goods company (k_2) and machines and equipment user (k_3), was higher than might be expected on a random basis. These findings lead to a rejection of the null hypothesis (H_0) that the rankings established by the respondents are unrelated among themselves. It may thus be affirmed, at a significance level ($\alpha \leq 0.05$) that price as the main order winning criterion, strategically aligned in the three links (k_1, k_2 and k_3) that were analyzed.

Similarly, the performance of the product or component as the second order winning criterion was also strategically aligned. Therefore, results of the study suggest that all links of the supply chain (suppliers, hub and clients) are aligned as to the importance of price and performance of products. Finally, with regard to the third and fourth criteria, it was not possible to reject the null hypothesis that the order winning criteria taken into consideration by the hub company and suppliers and immediate customers were independent or not aligned.

As a corollary, the data collected through the open-ended question disclosed some additional order winning criteria, including supplier reputation, replacement parts, after-sales services, foreign exchange rate, interest rate, popularity of the equipment on the market and transparent clear infor-mation (technical and commercial). None of the above-mentioned criteria predominated over the others, except for aspects related to foreign exchange and interest rates, with macro-economic connotations. Consequently, the listed criteria can be controlled and monitored by managers, just like foreign exchange and interest rates, and may also be explored through future studies.

CONCLUSIONS AND SUGGESTIONS FOR FUTURE STUDIES

The main purpose of this study was to ascertain strategic alignment through order winning criteria or competitive priorities from the standpoint of dyadic relationships in companies producing capital goods in Brazil. The findings indicate that product (or component) price and performance were the main competitive priorities used by the respondents for strategic alignment, from the standpoint of dyadic relationships in companies of the sample. Based on these findings, two theoretical implications emerged.

The first implication was associated with the relevance of the financial perspective, represented by price. Considering price as the main criterion showed that for a sample of Brazilian companies, the capital goods production chain adopted cost leadership as a competitive strategy (PORTER, 1985). These findings may be justified by the exposure of Brazilian capital goods companies to international competition whose macro-environmental influences include government stability, government spending on research, environmental protection laws and fluctuations in foreign exchange and interest rates, sometimes favoring imports, while encouraging exports at other times, resulting in price-based competition.

It should be highlighted that, from the management point of view, a way of lessening company exposure to outside influences encompasses a quest for higher productivity through modernizing the capital goods as well as pursuing a keener competitive edge through lower production costs, faster adaptation to market conditions, more reliable products, fewer complaints and prompt deliveries (SAKURAI, 1997).

The second implication, from a technical perspective, was represented by product (or component) performance. In this study, it was quite clear that the production chain managers considered aspects related to the project design and the implementation of the capital goods technology as the second most important criterion for strategic alignment. According to Ritzman and Krajewski (2003), it is not always possible to align capital goods with competitive priorities. If a company offers a single product or a high quality service, its competitive priorities may indicate the need for skilled employees, with manual work and individual attention, instead of representing a standout technology (RITZMAN; KRAJEWSKI, 2003). In this case, Black (1991) argues that the construction of specific equipment by the company may result in better performance, compared to equipment purchased from outside suppliers, as its development is tailored to respond to the priorities established by customer factors.

Consequently, in view of these findings and their theoretical implications, it seems that, at least in the sample addressed by this survey, companies producing capital goods were strategically aligned with their suppliers and customers from the dyadic relationship standpoint, with price being the main criterion and product (or compo-

nent) performance ranking second. However, it must be reiterated that, due to the non-random nature of the sample, these findings may not be generalized.

In this context, the following suggestions can be made for further studies in the future: a) the use of a fixed sample to conduct longitudinal studies, instead of cross-section studies, to focus on a smaller number of companies over longer periods; b) refining or updating the list of order winning criteria as reflected in the replies to the open-ended question, as they are constantly changing (BROWN *et al.*, 2006), making alignment dynamic (GATTORNA, 2006); and c) adapting the methodology used to other realities to foster a better understanding of the links between hub companies and their customers or consumers. Moreover, it is important to investigate change processes within broader contexts, such as economic, social and political contexts, together with the cause and effect of relationships of strategic alignments.

APPENDIX A: Order Winning Criteria and Questions
Order Winning Criteria

N_1 - Flexibility of delivery date. Able to deliver the product (or component) on an altered or modified date.

N_2 - Price. Able to compete at a low price for products or components similar to those made by the competition.

N_3 - Speed of delivery date. Able to respond more rapidly to customer orders and deliveries of products (or components) than competitors.

N_4 - Reliability of delivery date. Able to deliver the product (or component) acquired on the agreed date.

N_5 - Flexibility of contract alterations.

Able to accept changes in the contract during the fabrication period of the product (or component).

N_6 - Compliance with standards. Able to comply with in-house environment and labor safety standards for the fabrication of the product (or component).

N_7 - Compliance with project design. Able to comply with the operating standards and technical specifications set forth in the original design of the product (or component).

N_8 - Performance. Able to ensure the set of characteristics and yields set forth in the original design for the product (or component).

N_9 - Reliability of product (or component). Able to operate the product (or component) during the period between breakdowns, which should be as long as possible.

N_{10} - Flexibility of technical alterations. Able to accept technical modifications to the original design during the fabrication period of the product (or component).

N_{11} - Others.

Questions

Q.1) List in order of importance the first four order winning criteria for productions or components.

Q.2) Assign a weight of between 10% (optional for making a decision) and 100% (necessary for making a decision) to each of the order winning criterion for products or components. The weights may be the same.

Q.3) What other criterion is considered important for your company to win an order, as a product or component supplier, that you would like to mention?

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