Original Article

Operations strategy and analysis of competitive criteria: a case study of a food business

Estratégia de operações e análise dos critérios competitivos: um estudo de caso em uma empresa de alimentos

Sabrina Lohmann[1]
Daniel Pacheco Lacerda[1]
Luís Felipe Riehs Camargo[1]
Aline Dresch[1]

Abstract: This study proposes an alternative way to access customer priority information on competitive criteria that a food industry company needs to take into account. Based on this approach, it is possible to identify a consistent set of information that assists in the decision-making process at an operational strategy level, such as investments in dedicated or shared production lines, quality programs, and cost reduction. This study is a single embedded case study. Data were collected through interviews with ten customers of each business unit (BU). Descriptive statistics of the results were performed to analyze data: mean central tendency, standard deviation, and coefficient of variation. The Fleiss Kappa Index was then used to analyze the agreement between respondents' answers. Finally, a new statistical analysis was performed. This analysis was weighted considering the representativeness of each customer in the company's billing. The results show that there are differences among competitive priorities of each BU. In addition, the proportionality of participation of each BU in the company influences the order of preference of competitive criteria.

Keywords: Operations strategy; Competitive criteria; Customer vision; Fleiss Kappa Index.

Resumo: *Este trabalho tem como objetivo propor uma forma alternativa para acessar a informação da prioridade dos clientes em relação aos critérios competitivos que uma empresa da indústria de alimentos necessita considerar. A partir desta abordagem, é possível identificar um conjunto consistente de informações que auxilie no suporte do processo decisório no nível da estratégia de operações, como: investimentos em linhas de produção dedicadas ou compartilhadas, programas de qualidade e de redução de custos. A pesquisa foi conduzida por meio de um estudo de caso único incorporado. Os dados foram coletados, por meio de entrevistas, junto à 10 clientes de cada UN. Para análise dos dados foi utilizada estatística descritiva dos resultados: tendência central média, desvio padrão amostral e coeficiente de variação. Em seguida o Índice Fleiss Kappa foi utilizado para a análise da concordância das respostas dos entrevistados. Por fim, foi realizada uma nova análise estatística, desta vez ponderada, considerando a representatividade de cada cliente no faturamento da empresa. Os resultados demonstraram que existem diferenças entre as prioridades competitivas de cada UN. Além disso, pode-se concluir que a proporcionalidade de participação de cada UN na empresa, influencia na ordem de preferência dos critérios competitivos.*

Palavras-chave: *Estratégia de operações; Critérios competitivos; Visão do cliente; Índice Fleiss Kappa.*

1 Introduction

Economy globalization has led companies to seek alternatives in processes and operations in order to become competitive in the market. Management control has been expanded beyond the borders of companies, and the planning of operations has been carried out jointly between customers and suppliers. One of the objectives of this practice is to reduce total risk by improving the overall efficiency of the company in particular, and the production and supply chain in general. Thus, it is necessary to consider

[1] Universidade do Vale do Rio dos Sinos – UNISINOS, Avenida Unisinos, 950, Bairro Cristo Rei, CEP 93022-000, São Leopoldo, RS, Brasil, e-mail: sabrina.lohmann@gmail.com; dlacerda@unisinos.br; feliperiehs@yahoo.com.br; aldresch@gmail.com

Lohmann, S. et al.

Gest. Prod., São Carlos, v. 26, n. 3, e2290, 2019

the customer as an integral part of the team that will assist in defining essential criteria to obtain a competitive advantage (Moori et al., 2009), including in the context of the food industry.

The food industry, according to the Brazilian Association of Food Industries, had a revenue of over R$ 484.7 billion in 2013, and is responsible for creating 1.63 million jobs in Brazil. It is a world reference on quality in the production process (ABIA, 2014).

Operations strategy has evolved significantly over the past 25 years. Since Skinner's early work (1969), comprehensive reviews have been compiled by Leong et al. (1990) and Minor et al. (1994). In this sense, the present study intends to discuss how a company from the food sector can align processes and productive operations to the competitive criteria most valued by its customers in order to become more competitive.

Skinner (1974) and Hayes & Wheelwright (1984) stated that it is not possible to meet all criteria simultaneously. The impossibility of meeting all competitive criteria is called trade-off, which consists of a set of conflicts that require the prioritization of one criterion over another (Alves et al., 1995). This is a recurring debate in the field of operations management. Assuming that trade-offs related to the adoption of competitive criteria exist, it is necessary to understand them from the customer's point of view. This is necessary to better align the production system to the value that will be delivered to customers. Chart 1 shows some of the studies that

have sought to identify customer priorities in relation to competitive criteria.

One of the ways to access customer preferences in relation to competitive criteria is by performing a joint analysis. However, this type of study requires a great sample size and face-to-face interviews to obtain information on ordering of preferences (Hair et al., 2007). In the context of small and medium-sized companies, or of geographically dispersed customers, this method may not be appropriate. Another possibility is to conduct qualitative investigations such as focus groups and interviews. However, conducting such studies would require a long time, and could be costly. In addition, it could introduce analysis bias according to the criteria of selection of participants.

In this context, this study proposes an alternative way to access customer priority information regarding competitive criteria that a food industry company needs to take into account. The aim is to present and discuss the results of a simplified analysis, and identify priorities of competitive criteria and their ordering for different customer segments: outsourcing, ingredients, and distributors. The characteristics that distinguish each of these segments will be explained below.

In addition to this introduction, this study is composed of four other sections. The following section is a brief summary of the main theoretical concepts discussed in this research. Following, the methodological procedures are presented. Subsequently, the results are presented and discussed and, finally, the conclusion of this study is presented.

Chart 1. History of works that have sought to align production processes with the most valued competitive criteria by customers.

Author	Title	Analysis Method	Approach	Sector
Barros et al. (2003)	Competitive criteria of production: An exploratory study on the construction of buildings	Matrix Importance x Performance	Qualitative	Construction
Carpes & Scarpin (2005)	Analysis of the alignment of operations strategy with competitiveness strategy: The case of a tire reconditioning industry	Matrix Importance x Performance	Quantitative	Tires
Tomaszewski, Lacerda & Teixeira (2016)	Operations strategy of a Pilates studio: Analysis of competitive criteria and operational recommendations	Joint Analysis	Quantitative	Pilates Studio
Araújo et al. (2011)	Formulation of operations strategy using the matrix importance performance: A case study on the bakery sector in the city of Natal, RN	Matrix Importance x Performance	Quantitative	Bakery
Santos et al. (2012)	Competitive priorities for service operations strategy: An analysis of perceived value criteria of a health gym	Matrix Importance x Performance	Qualitative	Gym
Souza et al. (2014)	Exploratory analysis of the impacts of marketing decisions on the delivery performance of operations based on artificial neural networks	Artificial intelligence of neural networks	Quantitative	Operations

Source: prepared by the authors.

2 Theoretical basis

The objective of competitive strategy, according to Nogueira et al. (2001), is to gain profitable and sustainable advantage over competitors. The market characteristics of the economic sector, the configuration of the industry, and its managerial and operational capacity interfere with industrial competition (Nogueira et al., 2001). Although some of these factors allude to constraints external to the company, the decisions and actions outlined by strategic positioning will define to what extent such opportunities and adversities may affect the company's performance (Stefanovskaa & Soluncevski, 2015). The challenge of the decision-maker, therefore, is to choose or create an environmental context that leads to competitive advantages based on resources and competences (Teixeira et al., 2014).

Operations strategy, in turn, aims to sustain the company's competitive strategy (Klippel et al., 2005). The area of operations have discussed the contribution of the production function to the strategy of companies since its early developments in 1969 (Teixeira & Paiva, 2008). In this sense, it is necessary to observe that the strategic planning of the company should view the production system as a strategic element in which changes need to be implemented in order to achieve the objectives of the company as a whole (Vanalle et al., 2000). Operations strategy establishes policies and plans to optimize the company's resources, coordinating its broader operational objectives and goals. The strategy of operations is not static: it must be constantly updated taking into account changes that the company itself and the market undergo over time (Klippel et al., 2005).

According to Santos et al. (2011), the concept of operations strategy can be analyzed according to two views: the market-oriented view, and the resource-based view. The latter is guided "from inside out" with the aim of developing competencies that are unique and can guarantee competitiveness (Jensen et al., 2016). The market-oriented view, as its name implies, assumes that the strategy must be guided from "outside to inside," that is, it should be defined by market requirements (Helm et al., 2014).

After the operational strategy and its importance for organizations is briefly presented, it is important to present the competitive criteria that will support strategic formulations from the point of view of operations, as well as the respective trade-offs related to these criteria.

2.1 Competitive criteria and trade-offs

Competitive criteria allow the company to analyze the positioning of products in relation to the consumer market and to customers themselves (Antunes & Klippel, 2006). Several authors, such as Hayes & Wheelwright (1984), Slack (1993) and Paiva et al. (2004), have proposed competitive criteria for companies. The traditional competitive criteria are costs, quality, reliability of delivery, and flexibility. However, other criteria, such as performance of delivery and innovation, can also be taken into account according to the market in which the company operates (Dias et al., 2011).

The competitive criterion cost is defined as the ability to manufacture products at a lower cost than competitors (Carpes & Scarpin, 2005). Quality is defined as a consistent meeting of consumer expectations (Slack et al., 2002). Reliability of delivery can be defined as the delivery of products within the deadline promised to the customer (Teixeira & Paiva, 2008). Flexibility is the ability to provide a wide variety of products (Araújo et al., 2011).

The performance of delivery, in turn, refers to the company's ability to deliver its products and/or services to customers according to what was planned, also contributing to a greater level of trust in the customer-supplier relationship (Paiva et al., 2004). Innovation, which was later included among competitive criteria, is defined as the company's ability to launch new products and/or services in a short time (Antunes & Klippel, 2006).

Another competitive criterion addressed by some authors (Silva & Fernandes, 2009) is value generated. Value generated can be defined as how much customers are willing to pay for a product and/or a service taking into account the performance of its attributes and the perceived benefits (Silva & Fernandes, 2009). Companies should act to reduce their costs and increase the value generated in order to increase competitiveness (Bacic & Petenate, 2006).

It should be noted that, in the food industry, the concern of consumers with food quality and safety has been increasing, and this requires the industry to implement quality systems that guarantee food safety (Ribeiro-Furtini & Abreu, 2006). The consumer considers, at the moment of choice, issues such as appropriate hygienic practices, production methods, and biotechnology. Governments, on the other hand, are pressured to take measures to ensure food safety. Therefore, strict regulations regarding chemical, physical and biological contamination are being implemented (Andrade et al., 2013). Thus, food safety can also be considered a competitive criterion in the food industry. It is defined as the guarantee that the food will not sicken the consumer when prepared and/or consumed according to its intended use (ABNT, 2006).

In addition to recognizing competitive criteria as central to the formulation of operations strategy, it is necessary to understand the conflicts that may exist among competitive criteria. In this sense, it is necessary to understand the existence of a relation

between competitive criteria and tactical and structural decisions of operations; consequently, trade-offs need to be considered. The choice of competitive criteria and their alignment with company resources are important so that they can be put into practice (Teixeira & Paiva, 2008). Trade-offs are defined by the conflict between objectives: a better performance of a competitive criterion impairs the performance of another competitive criterion (Moori et al., 2009). According to this concept, it is practically impossible for a company to perform well on all competitive criteria.

However, some authors (e.g., Ferdows & De Meyer, 1990) suggest a lack of trade-offs based on the cumulative sand cone model. This model is based on the fact that competitive criteria are related to each other. Therefore, a good performance of one criterion would positively affect the other criteria, generating a continuous improvement (Teixeira & Paiva, 2008).

One of the traditional trade-offs is cost versus quality. For a company to lower its costs, quality would be adversely affected. Or, on the contrary, for there to be an improvement in product quality, there should be an increase in cost (Santos et al., 2012). Since 1970, the production process has been redesigned. Instead of reworking defective products, improvements in quality have been made. At the same time, cost have decreased. Thefore, high quality and low cost of production can be synonymous, that is to say, there is a trade-on, a virtuous circle (Moori et al., 2009).

The formulation of operations strategy should consider both conflicting relationships -trade-offs - and synergy relations (Santos et al., 2012). Considering that all the company's activities are correlated, making them efficient minimizes the total cost of operation; making the activities effective means that activities as a whole underpin operations strategy. The key to the development of operations strategy is to understand how to create or add value to customers. Therefore, knowing trade-offs and trade-ons is less important than understanding them from the point of view of customer/market (Moori et al., 2009).

2.2 Market-oriented vision

To develop an effective operations strategy, it is necessary to create or add value for the customer. In addition, competitors should also participate in the definition of competitive priorities, since it is necessary to satisfy the customer by being better than the competitor (Moori et al., 2009).

The objectives of the organization must be determined by the customers. Therefore, the customers' priorities must be translated by the company's operations strategy. Distinguishing competitive criteria into "order-winning," "qualifiers," and "less important" helps in understanding the desires of customers (Araújo et al., 2011). Order-winning criteria can be defined as the customer's main purchase reason (Araújo et al., 2011). Qualifier criteria, although not closing deals, may cause the company to lose business when absent or below acceptable levels (Araújo et al., 2011). When the criterion is below the qualifier level, the customer does not consider the product as an option (Santos et al., 2012). Thus, the least important criteria are those that do not influence or influence little the purchase decision of the customer (Araújo et al., 2011).

The importance of competitive criteria varies according to the industry, market or segment in which the company operates. Thus, it is important to conduct a market research with customers, elaborating an importance-performance matrix and defining the true priorities of the company (Araújo et al., 2011). One dimension evaluates the importance of criteria for customers, and the other dimension evaluates the performance of the company in relation to the competition. The positioning of the result in the matrix defines whether a criterion is "adequate," should be improved," require an "urgent action," or is "in excess" (Santos et al., 2012). The matrix allows a better visualization of competitive criteria to be worked on, and, consequently, a better development of actions that must be taken (Carpes & Scarpin, 2005).

3 Methodological procedures

A research can be defined as the gathering of information needed to answer a question, reaching the solution of a problem (Booth et al., 2005; Lacerda et al., 2013). A research is composed of steps, starting with the appropriate formalization of the problem up to the satisfactory presentation of results (Dresch et al., 2015a). To solve the proposed problem, the case study was selected as the research method.

The purpose of the case study is to deepen the knowledge about a problem not sufficiently known in order to instigate its meaning, suggest hypotheses, or further develop a theory (Yin, 2010). The classification of the case study can be carried out in terms of content (exploratory, explanatory, or descriptive) or number of cases (single - holistic or embedded case, or multiple - holistic or incorporated) (Miguel, 2007).

According to Yin (2010), the single case study is an appropriate method for various circumstances. It is used when it is the decisive case in testing a well-formulated theory, and when the theory defines a clear set of propositions, as well as in situations in which propositions are believed to be true (Dresch et al., 2015). In order to confirm, contrast or unfold the theory, there must be a unique case that satisfies all conditions for testing a theory (Yin, 2010). The single case study, therefore, aims to determine whether the propositions of a theory make sense or

if some alternative set of explanations may be more appropriate.

The single embedded case study was selected because the research was conducted in depth with several analysis units. This choice is based on the need to understand an in-depth phenomenon in the context in which it occurs (Dresch et al., 2015b). For this, the data collection was based on sources of evidence from the analysis of company documents, participant observation, and interviews (Yin, 2010). The details for conducting this study will be presented below.

3.1 Study method

The company analyzed in the present study operates in the market of biscuits and cereals with high added value for more than 25 years. Since 2009, the company has recorded an average growth of 35% per year, producing around 300 tons per month and having earned R$ 31.4 million in 2013. Currently, 35% of this revenue comes from retail, mainly from large distributors; 45% come from the production of cookies using customers' brands, denominated as outsourcing, and the rest is from the sale of ingredients to other companies.

In this study, three business units (BU) will be analyzed, namely i) distributors, ii) own brands (outsourcing), and iii) ingredients. For this, the competitive criteria that optimize the relationship between manufacturing and sales in the three business units will be defined, verifying if there is a significant difference from the point of view of customers. Chart 2 shows the propositions for the present study.

Based on these objectives, the case study was conducted taking into account the structure of steps proposed by Miguel (2007), as shown in Figure 1. That is, the theoretical conceptual framework of the research was first defined to then plan the cases. From this planning, a pilot test was carried out allowing adjustments to the instruments of data collection and analysis. After the adjustments, it was possible to conduct data collection and analysis and, finally, the development of this study, which details the conduction and the results obtained by this research. Each of these steps will be duly detailed.

Following the structure proposed by Miguel (2007), the definition of the theoretical conceptual structure that grounded this work was initially carried out. This structure was defined through a literature mapping, which allowed the development of a theoretical

Chart 2. Propositions for this study.

| Analysis Items		Proposition
Proposition 1		Competitive criteria have different priorities within the analyzed business units.
Proposition 2		Prioritized competitive criteria differ among the business units analyzed.
Proposition 3	3a	The proportionality of the company's participation in the revenue of the business unit: Distributors do not influence the order of preference of competitive criteria.
	3b	The proportionality of the company's participation in the revenue of the business unit: Outsourcing does not influence the order of preference of competitive criteria.
	3c	The proportionality of the company's participation in the revenue of the business unit: Ingredients do not influence the order of preference of competitive criteria.

Source: prepared by the authors.
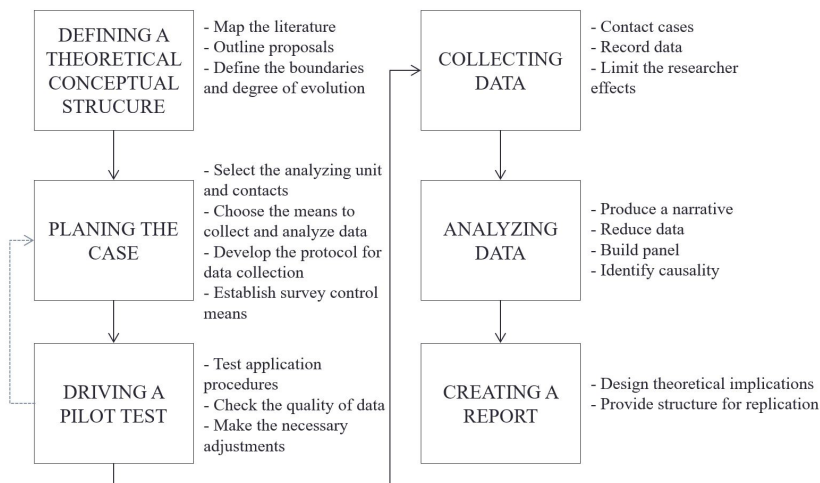
Figure 1. Steps for conducting the case study. Source: Miguel (2007, p. 221).

knowledge base for the study. Studies were selected from the systematic literature review to define competitive criteria. The selection of competitive criteria included the most present criteria in the several economic segments reported in the literature. At this stage, the delineation of propositions and the delimitation of boundaries and degrees of evolution addressed by this study were also defined.

At the second stage, the planning of the case, the analysis units and contacts were selected. For each of the business units evaluated in the study, the ten largest customers in each segment were selected. The criterion for the selection of the ten largest customers is based on the fact that they are the most representative from the point of view of the company's revenue. Precisely because of this representativeness, they are customers that present a higher level of demand of the company.

The contacts chosen to answer the survey were buyers, purchasing managers, outsourcing or R&D representatives, as detailed in Chart 3.

The next step included the choice of means for data collection and analysis. The data collection technique was a questionnaire structured with closed questions. The data were collected by sending the questionnaires using the *GoogleDocs* tool. Next, the protocol for data collection and the search control method was defined. The contact with the interviewees was carried out by sending the questionnaire link by e-mail to respondents, and the answers were automatically tabulated in an MS Excel worksheet.

A pilot test, as proposed by Malhotra (2001), was conducted by sending the interview link to the customers interviewed, thus testing the application procedures. Pilot participants were selected according

Chart 3. Information on Interviewed Customers.

Business Unit and Customer		Percentage of Company Revenue (%)	Percentage of Business Unit Revenue (%)	Position of the interviewee	Relationship Time with the Company (Years)
Distributors	Customer 1	1.6	35.3	Partner	2
	Customer 2	0.6	12.9	Director	1
	Customer 3	0.5	11.0	Partner	1.5
	Customer 4	0.4	7.8	Commercial Manager	2
	Customer 5	0.3	7.4	Managing Partner	1
	Customer 6	0.3	7.1	Manager	1
	Customer 7	0.3	5.6	Purchasing	3
	Customer 8	0.2	5.0	Commercial Manager	1
	Customer 9	0.2	5.0	Commercial Director	1
	Customer 10	0.1	2.9	Owner	2
Outsourcing	Customer 1	*	*	*Outsourcing Procurement*	15
	Customer 2	22	28	*Contract Manufacturing*	5
	Customer 3	17	22	Own Company Manager	6
	Customer 4	*	*	*External Supply Chain*	-
	Customer 5	12	16	*R&D* - Exclusive Brands	10
	Customer 6	10	12	*Contract Manufacturing Manager*	-
	Customer 7	5.2	6.8	Corporate and Strategic Purchases	4
	Customer 8	3.8	4.9	Own Brand	5
	Customer 9	2.2	2.9	Product Development Supervisor	7
	Customer 10	2.2	2.9	Third Party Manager	15
Ingredients	Customer 1	4	44	Procurement Brazil	10
	Customer 2	3	36	PPC/purchases	3
	Customer 3	1	7.0	Purchasing	3
	Customer 4	0.4	4.6	Supplies	2
	Customer 5	0.3	3.5	Purchasing	4
	Customer 6	0.3	3.1	Purchasing Manager	2
	Customer 7	0.1	1.4	Purchasing	1
	Customer 8	0.1	0.9	Purchasing	4
	Customer 9	0.003	0.03	Purchasing	0.5
	Customer 10	0.003	0.03	Purchasing	2

*At product development stage. Source: The authors.

to convenience and ease of access to respondents (Yin, 2010). Twelve respondents were consulted during the pilot test. In this test, the answers of the interview followed a score of five points. It was verified that data quality was inadequate because the respondents, for the most part, assigned the maximum score (5) for all categories. Adjustments were made in the scale, increasing it from 5 to 7 points, and the research was redone, this time by telephone, seeking to ensure the adherence of respondents. The scale is shown in Chart 4, which shows the classification and the description of each point.

At the data collection stage, during the telephone interviews, the customers of the company studied were asked about the importance of each competitive criterion when choosing a supplier. The criteria chosen for the search are presented in Chart 5 along with their definitions.

The answers were recorded and later analyzed through the measures of mean central tendency, standard deviation, and coefficient of variation. The use of the average central tendency was chosen so that the evaluators' scores could be ordered according to the importance attributed by respondents. The standard deviation and the coefficient of variation were used so that the convergence between the answers could be evaluated (Malhotra, 2001).

The coefficient of variation, detailed in Equation 1, is the relative dispersion measurement used to estimate the precision of experiments, and represents the standard deviation of the sample (S) expressed as percentage of the sample mean ($\bar{x}$). Its main quality is the ability to compare different distributions, according to Equation 1.

$$CV = \frac{S}{\bar{x}} \qquad (1)$$

Subsequently, the Fleiss Kappa index was used to assess whether there was agreement among evaluators of each of the three business units. The Kappa index measures the degree of agreement in multiple evaluations of a same phenomenon. This method, introduced by Cohen in 1960, is widely used in Medicine, mainly by epidemiologists, in information reliability studies (Silva & Pereira, 1998). The Kappa index has the following variations: Cohen's Kappa, Fleiss Kappa, and Kappa Light. The Fleiss Kappa, as used in this work, is a statistical index that evaluates the reliability of a fixed number of evaluators, assigning classifications into categories of a series of items. The difference between the Fleiss Kappa and the original index, Cohen's Kappa, is that the latter only evaluates the agreement between two evaluators, whereas the Fleiss Kappa compares multiple evaluators (Light, 1971). The calculation of the Fleiss Kappa index can be performed by applying Equation 2.

Chart 4. Scale used in the survey.

Score	Classification	Importance
1	Insignificant	It is never considered by customers, and it will probably never be
2	Very Little Important	It is rarely considered by customers
3	Little Important	Usually not considered by customers, but may become important in the future
4	Indifferent	Around the industry average
5	Important	It provides a useful advantage to most customers - it is usually considered
6	Very important	It provides important advantage to customers - it is always considered
7	Extremely important	It provides crucial advantage to customers - it is the main driver of competitiveness

Source: The authors.

Chart 5. Definition of Competitive Criteria for Customer Interviews.

Competitive Criterion	Definition
Generated Value	How much buyers are willing to pay for the product and/or service considering the performance of its attributes and the perceived benefits (Silva & Fernandes, 2009)
Quality	Consistent compliance with consumer expectations (Slack et al., 2002)
Delivery Reliability	Deliver products within the promised time frame (Teixeira & Paiva, 2008)
Flexibility of Compound/Product	Ability to provide a wide variety or compound of products (Araújo et al., 2011)
Innovativeness	Ability of the company to launch new products and/or services in a short time (Antunes & Klippel, 2006)
Food Safety	Ability to control hazards in order to ensure that food is safe until the moment of human consumption (Ribeiro-Furtini & Abreu, 2006)
Delivery speed	Deliver products faster (Paiva et al., 2004)

Source: The authors.

$$k = \frac{P - Pe}{1 - Pe} \tag{2}$$

Where:

P: proportion of *n* times the respondents agreed

Pe: expected proportion of *n* times the respondents agreed

n: Number of elements in the scale

The denominator of Equation 2 means the degree of agreement attainable above chance, whereas the numerator means the degree of agreement actually reached rather than by chance. If the evaluators are in complete agreement, then k = 1. If there is no agreement among evaluators, then k ≤ 0 (Light, 1971). Chart 6 presents a scale of interpretation of the Fleiss Kappa index.

Then, a weighted analysis of means, standard deviation and coefficient of variation of the responses was conducted. In order for high importance customers to have their answers valued, their responses were replicated, privileging, therefore, the opinion of those who had a greater representation in the sales of the business unit analyzed. For the replication of customer responses, the Equation 3 was used.

$$P_{i,k} = \frac{F_{i,k}}{arg\ Min\ f(k)} \tag{3}$$

Where:

P is the weight of customer answers;

F is customer revenue;

arg Min f (k) is the vector containing the revenue of all customers of a given business unit

i is the customer under analysis;

k is the business unit to which the customer belongs.

Based on the procedures described above, a number of results could be obtained. These results, as well as their analysis, are described in the next section of this study.

4 Results and discussions

Based on the answers obtained in the interviews, the results were estimated according to Tables 1-3 for the business units distributors, outsourcing and ingredients, respectively. It should be noted that the order of competitive criteria was defined by the arithmetic means obtained and, in case of a tie, the alphabetical order was used.

The result obtained for customers of the business unit distributors, according to Table 1, is in line with what

Chart 6. Classification of Fleiss Kappa results.

K	Interpretation
<0	Poor agreement
0.01 – 0.20	Slight agreement
0.21 – 0.40	Fair agreement
0.41 – 0.60	Moderate agreement
0.61 – 0.80	Substantial agreement
0.81 – 1.00	Almost perfect agreement

Source: Light (1971).

Table 1. Basic Analysis of Results of the Business Unit: Distributors.

		Arithmetic Mean	Standard Deviation	Coefficient of Variation	Order of Importance
Competitive Criteria	Delivery Reliability	6.50	0.67	10%	1
	Delivery speed	6.40	0.66	10%	2
	Generated Value	6.20	0.75	12%	3
	Quality	5.80	0.87	15%	4
	Food Safety	5.80	0.98	17%	5
	Flexibility of Compound/Product	5.20	0.75	14%	6
	Innovativeness	4.40	0.92	21%	7

Source: The authors.

Table 2. Basic Analysis of Results of the Business Unit Outsourcing.

		Arithmetic Mean	Standard Deviation	Coefficient of Variation	Order of Importance
Competitive Criteria	Quality	7.00	0.00	0%	1
	Food Safety	6.90	0.30	4%	2
	Generated Value	6.00	0.77	13%	3
	Innovativeness	5.80	1.25	22%	4
	Delivery speed	5.80	0.75	13%	5
	Delivery Reliability	5.70	0.46	8%	6
	Flexibility of Compound/Product	5.60	1.28	23%	7

Source: The authors.

Operations strategy and analysis...

Gest. Prod., São Carlos, v. 26, n. 3, e2290, 2019

Table 3. Basic Analysis of Results of the Business Unit Ingredients.

		Arithmetic Mean	Standard Deviation	Coefficient of Variation	Order of Importance
Competitive Criteria	Food Safety	6.70	0.46	7%	1
	Quality	6.50	0.67	10%	2
	Generated Value	6.10	0.54	9%	3
	Delivery speed	6.10	0.70	11%	4
	Delivery Reliability	5.50	0.50	9%	5
	Innovativeness	5.30	1.42	27%	6
	Flexibility of Compound/Product	3.70	1.19	32%	7

Source: The authors.

was observed in the daily relationship with customers. This is because, for distributors, delivery reliability, delivery speed and the value generated (price) are essential, as they compete for retail customers, where turnover is high and competition is fierce. The retail sector is dominated by large networks. Distributors end up with the market share of small and medium-sized points of sale, where prices are usually higher and, in order to differentiate themselves, it is necessary to be efficient in meeting deadlines.

Criteria such as food quality and safety were in the fourth and fifth place, respectively. They are very important criteria that may be decisive for sales, but are less important than delivery. The flexibility of composite and innovation criteria, in turn, were shown to be less important for this segment. Compound flexibility is important for this segment as retailers' customers look for suppliers who can offer variety to their shelves. Innovativeness has proved to be less important, because distributors are at the top of the chain, not receiving the market demands for new products so strongly. By analyzing the coefficient of variation for this segment, it can be said that the evaluators differ in answers, since the coefficients vary from 10 to 21%, which suggests a greater divergence on what is important for customers.

Another important fact is that most criteria, on average, received a score higher than 5 (the exception was innovation). That is, according to the scale used, most criteria were considered important, very important or extremely important. This indicates that customers have a high requirement and that no criteria cited could be disregarded.

Table 2 presents the results for the business unit outsourcing, which comprises outsourcing customers. In this business unit, customers can be categorized into two types: multinationals, i.e., large food companies that outsource part of their products to smaller companies; and large supermarket chains, which offer products with their brand to their customers, called own brand.

The criterion that ranked first was quality. It had the average score of 7, with a coefficient of variation

0%, which indicates unanimity among customers. Everyone considered this criterion extremely important. This group is composed of large companies, whose products are produced with their brands' names by third parties, therefore quality is considered important. Likewise, food safety, which ranked second, had an average score of 6.90 and a coefficient of variation of 4%. It was also considered extremely important by customers, who agreed with each other regarding this matter since any problem related to this issue can compromise the brand.

In third place was generated value, with a 6.0 score and a coefficient of variation of 13%, proving that price is very important for this category since competition is also fierce. The consumer understands that branded products of the large supermarket chains must have the same quality as the market leader, since they are often produced by the same manufacturer, but should be the cheapest in the shelves. In this case, the trade-off cost x quality is evident.

The criterion innovativeness, in this case, is also important because some companies in this segment, mainly multinationals, use outsourcing as a laboratory, and launch an innovative product in a test market. Such products are manufactured by a third party with a lower investment. Later, companies evaluate its viability, and launch the product in their own factories, with higher investments. The score for this criterion was 5.8 and the coefficient of variation was 22%, which indicates that there is some disagreement between scores attributed by the interviewees. Fifth, sixth and seventh places were delivery speed, delivery reliability, and composite flexibility, with scores of 5.8, 5.7 and 5.6, respectively, and coefficients of variation of 13, 8 and 23%. Customers in this segment give high scores to all criteria because their demand is great, and bad performances are not accepted in any of these items. The process of approving suppliers of outsourcing is very complex. Quality, social responsibility and financial audits are carried out to ensure that suppliers are of a high level. The coefficients of variation are in general low (0-13%), which shows agreement among interviewees.

The coefficient was higher only for innovation (22%) and composite/product flexibility (23%) because these criteria refer more to the profile of the products/services customers seek than specifically to the performance of the supplier.

Regarding the business unit ingredients, the main results can be seen in Table 3. This business unit is composed mostly of large food companies that use the products as inputs to their production line.

The food industry has been under pressure to provide food safe for human consumption, which justifies the fact that the criteria food safety and quality are in first and second place, with high averages and low coefficients of variation. As can be seen in Table 3, these are extremely important criteria and customers agree with each other.

The value generated, in turn, is very important for this segment since, in order to compete in the market, industries need to have prices lower than those of their competitors. In addition, the negotiation in the purchase of raw materials is importance in this case. Multinational companies make their suppliers compete to obtain the lowest price. They also enter into supply contracts with their suppliers to ensure that prices do not increase during the period of validity. For this criterion, the coefficient of variation was 9%, which reflects agreement among the evaluators for this criterion. Delivery speed is also considered very important.

Secondly, delivery reliability is considered important. This is justified because uncertainty in the delivery of inputs can slow down a whole production schedule and undermine the performance of the company as a whole. For customers of this business unit, innovation was scored with 5.3, indicating that the criterion is considered important since most companies are industries that need to launch new products constantly to remain active in the market. However, the coefficient of variation was high. This may be justified because some customers are small, regional industries that do not value the constant launch of new products. The flexibility of compound/product, in turn, was 3.70, which is considered low. It indicates

that, for customers of this business unit, variety is not important. However, as for innovation, these criteria had a high coefficient of variation because this business unit comprises companies with different profiles and sizes.

This business unit was the only one that obtained a score lower than 4 (little important and indifferent) for one competitive criterion: composite/product flexibility. This clearly portrays the profile of this business unit: customers are interested in a mix of existing products. The fact that the company is flexible and able to provide a greater product range than the existing one is not a differential.

Table 4 summarizes results that should be considered for the prioritization of competitive criteria in each business unit.

To assess the general agreement among the interviewees of the three business units, the Fleiss Kappa index was applied. The results of this application can be seen in Table 5.

The results showed a slight agreement for the evaluators of the business units ingredients (0.127) and distributors (0.0272), and a reasonable agreement for outsourcing (0.222), on a scale of 0 to 1. The probability of the statistic test indicated by the P-value indicates, with a level of significance of 95%, that the Fleiss Kappa indexes of the business units ingredients and outsourcing are significant (p-value <0.05) and non-zero. Due to the low agreement, according to the Fleiss Kappa index, and the fact that the index does not take into account the representativeness of each customer in the revenue, a weighted analysis of answers was carried out, granting a greater weight to customers with a greater representativeness in revenues. The weighted results, as well as the original order, are summarized in Tables 6-8.

For the business unit distributors, the sequence of criteria had a small change. Delivery reliability, delivery speed and generated value remained in the same scoring ranks: first, second and third, respectively. Food quality and safety, which were previously tied (average of 5.8), increased to 6.16 for food safety and 5.74 for quality. This small change shows that

Table 4. Competitive Criteria Priorities for each segment.

Competitive Criterion	Criteria priority order		
	Outsourcing	Ingredients	Distributors
Quality	1	2	4
Food Safety	2	1	5
Generated Value	3	3	3
Innovativeness	4	6	7
Delivery speed	5	4	2
Delivery Reliability	6	5	1
Flexibility of Compound/Product	7	7	6

Source: The authors.

the most representative distributors in this segment are already more concerned about food safety, which is a trend of the market. Composite flexibility and innovation also had a reversed order. This change also reflects the behavior of larger customers, which are aligned with the behavior of large industries seeking

innovative products to remain competitive in the market. The coefficients of variation decreased. However, they are still high: above 15% for food safety, quality, innovation, and flexibility of compound/product. This means that, even after weighting, agreement is low for these criteria. This is due to the fact that, in this business unit, there are no significant differences between customer invoices, and therefore weighting does not change the results significantly.

In the business unit outsourcing, the first and second criteria remained unchanged (food quality and safety, respectively). The third and fourth places reversed. In the basic analysis, the value generated was in third and innovation in fourth place. After the weighted analysis, innovation was considered more important. This is because the most representative customers value

Table 5. Fleiss Kappa results for the agreement between the evaluators of each business unit.

Business Unit	Fleiss Kappa Index	P-value
Ingredient	0.127	<0.01
Outsourcing	0.222	<0.01
Distributors	0.0272	0.409

Source: The authors.

Table 6. Weighted Analysis of Results of the Business Unit Distributors.

Competitive Criterion	Arithmetic Mean	Standard Deviation	Coefficient of Variation	Weighted Prioritization	Prioritization Before Weighting
Delivery Reliability	6.66	0.58	8.7%	1	1
Delivery speed	6.21	0.66	10.7%	2	2
Generated Value	6.18	0.69	11.2%	3	3
Food Safety	6.16	0.95	15.3%	4	5
Quality	5.74	0.86	15.0%	5	4
Innovativeness	4.97	0.94	19.0%	6	7
Flexibility of Compound/Product	4.95	0.84	16.9%	7	6

Source: The authors.

Table 7. Weighted Analysis of Results of the Business Unit Outsourcing.

Competitive Criteria	Arithmetic Mean	Standard Deviation	Coefficient of Variation	Weighted Prioritization	Prioritization Before Weighing
Quality	7.00	0.00	0.0%	1	1
Food Safety	6.97	0.18	2.6%	2	2
Innovativeness	6.37	1.07	16.7%	3	4
Generated Value	6.08	0.60	9.8%	4	3
Flexibility of Compound/Product	6.07	0.96	15.9%	5	7
Delivery speed	5.83	0.70	12.0%	6	5
Delivery Reliability	5.81	0.39	6.8%	7	6

Source: The actors.

Table 8. Weighted Analysis of Results of the Business Unit Ingredients.

Competitive Criteria	Arithmetic Mean	Standard Deviation	Coefficient of Variation	Weighted Prioritization	Prioritization Before Weighting
Food Safety	6.97	0.33	4.8%	1	1
Quality	6.94	0.41	6.0%	2	2
Delivery speed	6.88	0.51	7.4%	3	4
Innovativeness	6.36	0.78	12.2%	4	6
Generated Value	5.98	0.31	5.1%	5	3
Delivery Reliability	5.92	0.36	6.1%	6	5
Flexibility of Compound/Product	3.98	1.57	39.5%	7	7

Source: The authors.

innovation above all. They are often multinationals with global innovation goals. Composite/product flexibility, which was the last criterion, moved to fifth place. This is also a reflection of large companies that need to be constantly increasing their variety of products on the market. Delivery speed and delivery reliability rose from the fifth and sixth to the sixth and seventh position, respectively, and are not considered as important in this segment.

The coefficients of variation generally decreased because there are customers in this business unit with revenues significantly higher than others, which, after weighting, favor them by the replication and the consequent convergence of their answers. The highest coefficients of variation were for innovation (16.7%), composite/product flexibility (15.9%) and delivery speed (12%), which may be related to the fact that this BU is composed of two types of customers: multinationals and supermarket chains, which prioritize the mentioned criteria in a different way due to their position in the market.

For the customers of the business unit ingredients, food safety and quality remained in the first and second place in the weighted analysis. Delivery speed, which was in fourth place, moved to third, and innovation, which was in sixth place, moved to fourth. The generated value decreased from second to fifth place. Delivery reliability rose from fifth to sixth place, and product/composite flexibility remained at the last place. The weighted analysis of the ingredients segment has shown that companies that represent a larger share of the revenue, because they are large industries, value delivery speed, which affects directly the performance of their production lines, and innovation, because they are representative companies in the market in which innovation is necessary to guarantee competitiveness.

The great variation in the positioning of competitive criteria after weighting the results is due to the great difference between the revenues of customers of this business unit. According to Chart 4, the largest customer accounts for 44% of revenue in the business unit, while the smallest customer represents only 0.03%. The coefficient of variation, which was 39.5% for product flexibility, the highest in the whole study, is because the largest customers of this business unit differ in the evaluation of this criterion.

In relation to the propositions presented in Chart 3, it can be stated that 1 and 2 are true. This is because prioritized competitive criteria are different, and have different priorities depending on the business unit analyzed. The proposals 3a, 3b and 3c, in turn, are false, because the proportionality of the company's participation in the revenue in all business units influences the order of preference of competitive criteria.

5 Conclusions

Based on the analyses carried out, it is possible to conclude that each business unit has different priorities, and that it values competitive criteria differently. However, the production lines of the company in question are not dedicated each to a business unit, which restricts the prioritization of criteria for each type of customer.

The company in question has versatile production lines and can manufacture products of three business units. Thus, on the one hand, it has a competitive advantage in terms of flexibility of the production line. On the other hand, shared operations may limit decision-making in isolation for each business unit. Top management should decide, as far as competitive criteria are concerned, the best possible way to conduct business so that none of the units is hindered. An alternative would be to transform current operations into exclusive operations per business unit. However, this action would require a large investment in machinery, so that each line could be able to make all the products of a business unit. In addition, there would be a need for an increase in the number of employees.

Food quality and safety, for example, ranked first in the segments outsourcing and ingredients, but ranked fourth and fifth in the segment distributors. They are criteria that, once prioritized, will be adopted by the company as a whole, there being no reason to prioritize them for one part of the customers and not for another part. Innovativeness, which is in third, fourth and sixth place for outsourcing, ingredients and distributors, respectively, can be considered a criterion to be prioritized, considering that the company in question works with a niche market where innovation is of utmost importance for differentiation. Value generated ranked fourth, fifth and third for outsourcing, ingredients and distributors, respectively, showing that price influences the purchase decision of customers of the three business units.

Although quality and cost are trade-off aspects, several studies have shown that when a company works with quality, it reduces waste and rework, consequently reducing costs. The speed of delivery ranked sixth, third and second place for outsourcing, ingredients and distributors, also emerging as a criterion to be prioritized by all business units. Delivery reliability ranked seventh, sixth and first place for outsourcing, ingredients and distributors, respectively, and cannot be considered a criterion to prioritize for all units or for the organization as a whole. Composite flexibility also does not prove to be a criterion worth of focus since it ranked fifth for outsourcing, seventh for ingredients, and seventh for distributors.

This set of data can help the company in its managerial decisions by explaining which investments should be

made and which should be secondary. For example, there should be implementation of quality systems, which guarantee both quality and food safety, or an increase in research and development efforts to foster innovation. In addition, focusing on improvement programs, which can increase productivity and improve supplier selection, is able to guarantee a competitive price, pleasing the customer also with respect to the value generated.

The simplified analysis of the data was effective, reaching the objective of identifying the priorities of competitive criteria and their order for different customer segments. The results found are in line with the customer profile of each business unit, which supports the company's decision-making. Other approaches mentioned above, such as joint analysis or focus groups (interviews), if used, could make the work complex, expensive and inconclusive, since the present work deals with a medium-sized company with a limited number of customers and limited resources to carry out the study.

Qualitative studies in production engineering and operations management can use objective approaches to contribute to qualitative researches. This work was based on the Fleiss Kappa index to assess the degree of agreement among respondents. This measurement has been extensively used in other research areas, such as Medicine, for example. However, its use in production engineering and operations management is still incipient. It could contribute to facilitate deepening on the reasons of agreement or disagreement of interviewees, even in a qualitative research in a strict sense.

Although the food sector in Brazil is significantly representative in economic terms, it has been neglected by studies on production engineering and operations management. Because it is an industry of low technological intensity and, at the same time, an aggregator of value for the Brazilian economy, additional studies in this segment are necessary. Low technology industries, as defined by the OECD (Organization for Economic Co-operation and Development), are characterized by being in traditional sectors and using mature and widespread technologies. In this context, both operations strategy in particular and the broad set of knowledge of production engineering in general may be relevant to this industry.

As a suggestion for future works, aspects related to the cost of transforming shared operations into exclusive operations could be addressed, in addition to the other impacts on the business arising from this transformation. It is also suggested to study the weighting of representativeness of business units in relation to the company, which could provide a general result of customers independent from the business unit, valuing the representativeness of each customer in the company as a whole, since there

are more or less representative business units in the company's revenue. Although far from the central discussion of this research, from the point of view of operations strategy and production management, further studies are needed. First, as highlighted, a greater focus on the food industry. Secondly, a deeper understanding of the strategy and management of ETO (Engineering-To-Order) production systems. Third, the implications of additive manufacturing in production systems and, consequently, productivity and competitiveness of companies. Fourth, integration among the various functional areas of the organization, especially the marketing-operations interface. Finally, this work had an exploratory/descriptive approach, similar to other studies in this area. Further prescriptive studies are needed to assist organizations in their quest for competitive advantage. In this sense, it is possible to emphasize the need of studies that use design science and design science research as methodological approaches to support this prescriptive research.

The limitations of the present study were, for example, the scale used in the questionnaires (seven points). Customers, believing that the supplier needs excellence, end up assigning very high scores to all criteria, which may mask the results. The suggestion is to use a scale in which the respondent can assign scores in such a way that the sum does not exceed a certain value, thus making the respondent assign high scores only to the criteria that she/he believes are really important. Another limitation concerns the statistical analysis performed, which aims to evaluate the agreement among evaluators, but does not allow weighting their importance.

References

Alves, A. G. Fo, Pires, S. R. I., & Vanalle, R. M. (1995). Sobre as prioridades competitivas da produção: compatibilidades e seqüências de implementação. *Gestão & Produção*, 2(2), 173-180. http://dx.doi.org/10.1590/S0104-530X1995000200005.

Andrade, J. C., Deliza, R., Yamada, E. A., Galvão, M. T. E. L., Frewer, L. J., & Beraquet, N. J. (2013). Percepção do consumidor frente aos riscos associados aos alimentos, sua segurança e rastreabilidade. *Brazilian Journal of Food Technology*, 16(3), 184-191. http://dx.doi.org/10.1590/S1981-67232013005000023.

Antunes Jr, J. A. V., & Klippel, M. (2006). Estratégia de produção: conceituação, critérios competitivos e categorias de decisão. In *Anais do III Simpósio de Excelência em Gestão e Tecnologia* (pp. 1-10). Rio de Janeiro: SEGeT.

Araújo, J. P. F., Barroco, A. G., Freitas, J. O. No, Freire, P. H. O., & Campos, J. M. (2011). Formulação de estratégia de operações utilizando a matriz importância desempenho: um estudo de caso no setor de padarias na cidade do Natal-RN. In *Anais do XXXI Encontro*

Lohmann, S. et al.

Gest. Prod., São Carlos, v. 26, n. 3, e2290, 2019

Nacional de Engenharia de Producão (p. 13). Belo Horizonte: ENEGEP.

Associação Brasileira de Indústrias de Alimentos – ABIA. (2014). Recuperado em 25 de outubro de 2014, de http://www.abia.org.br/vs/setoremnumeros.aspx

Associação Brasileira de Normas Técnicas – ABNT. (2006). *ABNT NBR ISO 22000:2006. - Sistemas de gestão da segurança de alimentos*. Rio de Janeiro: ABNT.

Bacic, M. J., & Petenate, A. J. (2006). Modelo para melhoria de processos aplicado na gestão de custos. *Revista Universo Contábil*, 2(3), 9-24. http://dx.doi.org/10.1017/CBO9781107415324.004.

Barros, J. No, Fensterseifer, J. E., & Formoso, C. T. (2003). Os critérios competitivos da produção: um estudo exploratório na construção de edificações. *Revista Administração Contemporânea*, 7(1), 67-85. http://dx.doi.org/10.1590/S1415-65552003000100004.

Booth, W. C., Colomb, G. G., & Williams, J. M. (2005). *A arte da pesquisa*. São Paulo: Martins Fontes. 352 p.

Carpes, A. M. S., & Scarpin, J. E. (2005). Análise do alinhamento da estratégia de operações com a estratpegia de competitividade: o caso de uma indústria recondicinadora de pneumáticos. *Produção*, 15(2), 286-299.

Dias, M. F. P., Fernstenseifer, J. E., & Sellitto, M. A. (2011). Análise multicriterial em estratégia de operações: estudo de caso com compradores de arroz de seis redes supermercadistas. *Revista Produção Online*, 11(3), 707-734. http://dx.doi.org/10.14488/1676-1901.v11i3.669.

Dresch, A., Lacerda, D. P., & Antunes, J. A. V. Jr (2015a). *Design Science Research: a method for science and technology advancement.* Heidelberg: Springer.

Dresch, A., Lacerda, D. P., & Antunes, J. A. V. Jr (2015b). *Design Science Research: método de pesquisa para avanço da ciência e tecnologia* (Vol. 1). Porto Alegre: Bookman.

Dresch, A., Lacerda, D. P., & Cauchick Miguel, P. A. (2015). A distinctive analysis of case study, action research and design science research. *Revista Brasileira de Gestão de Negócios*, 17(56), 1116-1133. http://dx.doi.org/10.7819/rbgn.v17i56.2069.

Ferdows, K., & De Meyer, A. (1990). Lasting improvements in manufacturing performance: in search of a new theory. *Journal of Operations Management*, 9(2), 168-184. http://dx.doi.org/10.1016/0272-6963(90)90094-T.

Hair, J. Jr, Babin, B. J., Money, A. H., & Samouel, P. (2007). *Fundamentos de métodos de pesquisa em administração*. Porto Alegre: Bookman.

Hayes, R. H., & Wheelwright, S. C. (1984). R*estoring our competitive edge: competing through manufacturing*. New York: John Wiley e Sons.

Helm, R., Krinner, S., & Schmalfuß, M. (2014). Conceptualization and Integration of Marketing Intelligence: The Case of an Industrial Manufacturer.

Journal of Business-To-Business Marketing, 21(4), 237-255. http://dx.doi.org/10.1080/1051712X.2014.979587.

Jensen, J. A., Cobbs, J. B., & Turner, B. A. (2016). Evaluating sponsorship through the lens of the resource-based view: the potential for sustained competitive advantage. *Business Horizons*, 59(2), 163-173. http://dx.doi.org/10.1016/j.bushor.2015.11.001.

Klippel, M., Antunes Júnior, J. A. V., & Paiva, E. L. (2005). Estratégia de produção em empresas com linhas de produtos diferenciadas: um estudo de caso em uma empresa rodoferroviária. *Gestão & Produção*, 12(3), 417-428. http://dx.doi.org/10.1590/S0104-530X2005000300011.

Lacerda, D. P., Dresch, A., Proença, A., & Antunes, J. A. V. Jr (2013). Design Science Research: A research method to production engineering. *Gestão & Produção*, 20(4), 741-761. http://dx.doi.org/10.1590/S0104-530X2013005000014.

Leong, G. K., Snyder, D. L., & Ward, P. T. (1990). Research in the process and content of ma-nufacturing strategy. *Omega*, 18(2), 109-122. http://dx.doi.org/10.1016/0305-0483(90)90058-H.

Light, R. J. (1971). Measures of response agreement for qualitative data : some generalizations and alternatives. *Psychological Bulletin*, 76(5), 365-377. http://dx.doi.org/10.1037/h0031643.

Malhotra, N. K. (2001). *Pesquisa de marketing: uma orientação aplicada*. São Paulo: Bookman Editora.

Miguel, P. A. C. (2007). Estudo de caso na engenharia de produção: estruturação e recomendações para sua condução. *Produção*, 17(1), 216-229. http://dx.doi.org/10.1590/S0103-65132007000100015.

Minor, E. D., Hensley, R. L., & Robley Wood, D. (1994). A review of empirical manufacturing strategy studies. *International Journal of Operations & Production Management*, 14(1), 5-25. http://dx.doi.org/10.1108/01443579410049252.

Moori, R. G., Ghobril, A. N., & Marcondes, R. C. (2009). Alinhamento das prioridades competitivas entre compradores e vendedores de máquinas e equipamentos. *RAM. Revista de Administração Mackenzie*, 10(4), 156-182. http://dx.doi.org/10.1590/S1678-69712009000400008.

Nogueira, E., Alves, A. G. Fo, & Torkomian, A. L. V. (2001). Empresas de revestimento cerâmico e suas estratégias competitivas e de produção. *Gestão & Produção*, 8(1), 84-99. http://dx.doi.org/10.1590/S0104-530X2001000100007.

Paiva, E. L., Carvalho, J. M. Jr, & Fensterseifer, J. E. (2004). *Estratégia de produção e de operações: conceitos, melhores práticas, visão de futuro*. Porto Alegre: Bookman.

Ribeiro-Furtini, L. L., & Abreu, L. R. (2006). Utilização de APPCC na indústria de alimentos. *Ciência e Agrotecnologia*, 30(2), 358-363. http://dx.doi.org/10.1590/S1413-70542006000200025.

Santos, L. C., Gohr, C. F., & Varvakis, G. (2011). Um método para identificação e análise de competências e recursos estratégicos das operações de serviços. *Gestão & Produção*, 18(4), 791-808. http://dx.doi.org/10.1590/S0104-530X2011000400008.

Santos, L. C., Gohr, C. F., & Varvakis, G. (2012). Prioridades competitivas para a estratégia de operações de serviços: uma análise dos critérios de valor percebido de uma academia de ginástica. *Produção Online*, 12(1), 133-158. http://dx.doi.org/10.14488/1676-1901.v12i1.837.

Silva, E. F., & Pereira, M. G. (1998). Avaliação das estruturas de concordância e discordância nos estudos de confiabilidade. *Revista de Saude Publica*, 32(4), 383-393. http://dx.doi.org/10.1590/S0034-89101998000400012. PMid:9876431.

Silva, S. E., & Fernandes, F. C. F. (2009). A estratégia de operações baseada no valor. In *Anais do SIMPOI* (pp. 1-15). São Paulo: FGV-EAESP.

Skinner, B. F. (1974). *About behaviorism*. New York: Alfred A. Knopf.

Slack, N. (1993). *Vantagem competitiva em manufatura*. São Paulo: Atlas.

Slack, N., Chambers, S., & Johnston, R. (2002). *Administração da produção* (3rd ed.). São Paulo: Atlas.

Souza, A. M., Lacerda, D. P., Camargo, L. F. R., & Teixeira, R. (2014). Exploring the relationship between marketing and operations: neural network analysis of marketing decision impacts on delivery performance. *International Journal of Production Economics*, 153(June)

Stefanovskaa, L., & Soluncevski, M. (2015). Creating competitive organizational strategy using the funnel method. *Serbian Journal of Management*, 10(2), 235-245. http://dx.doi.org/10.5937/sjm10-8575.

Teixeira, R., & Paiva, E. L. (2008). Trade-offs em serviços customizados e o ponto de vista do cliente. *Revista de Administração Contemporânea*, 12(2), 457-480. http://dx.doi.org/10.1590/S1415-65552008000200008.

Teixeira, R., Lacerda, D. P., Antunes, J., & Veit, D. (2014). *Estratégia de Produção: 20 artigos clássicos para aumentar a competitividade da empresa*. Porto Alegre: Bookman.

Tomaszewski, L. A., Lacerda, D. P. & Teixeira, R. (2016). Estratégia de operações em serviços de saúde preventiva: análise dos critérios competitivos e recomendações operacionais. *Gestão & Produção*, 23(2), 381-396.

Vanalle, R. M., Alves, A. G. Fo, & Kuri, M. G. P. (2000). Estratégia competitiva e estratégia de produção: o caso de uma empresa de cosméticos. *Produção*, 10(2), 65-76. http://dx.doi.org/10.1590/S0103-65132000000200006.

Yin, R. K. (2010). *Estudo de caso: planejamento e métodos* (4th ed.). Porto Alegre: Bookman.