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## MULTIDIMENSIONAL APPROACH TO ELABORATE STRATEGIC MAP IN SMALL BUSINESSES THROUGH THE INTEGRATION BSC-AHP

### ABORDAGEM MULTIDIMENSIONAL PARA ELABORAR MAPA ESTRATÉGICO EM PEQUENAS EMPRESAS ATRAVÉS DA INTEGRAÇÃO BSC-AHP

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#### ABSTRACT

The organizational strategy can be seen as a complex issue because it is a phenomenon composed of multiple variables, with components that have different priorities and different forms of management. And, for this reason, organizations need solutions that allow them to analyze their posture vis-à-vis the market, considering scenarios composed of several variables. This work aimed to propose an approach to analyze organizational performance in small companies, using the integration between the Balanced Scorecard (BSC) and the Analytic Hierarchy Process (AHP) to formulate a strategic map. The theoretical basis discussed on competitive strategies, the BSC and the AHP. The methodology used a survey followed by a case study. The results suggest that the units of analysis (small companies in the furniture

segment) are aligned with their strategies and indicators, the strategic map recommends that, in order to differentiate themselves, these units should invest in servitization and benchmarking.

#### RESUMO

A estratégia organizacional pode ser vista como uma questão complexa, pois é um fenômeno composto por múltiplas variáveis, com componentes que têm prioridades diferentes e diferentes formas de gestão. E, por esse motivo, as organizações precisam de soluções que permitam analisar sua postura em relação ao mercado, considerando cenários compostos por diversas variáveis. Este trabalho teve como objetivo propor uma abordagem para analisar o desempenho organizacional em pequenas empresas, utilizando a integração entre o *Balanced Scorecard* (BSC) e o *Analytic Hierarchy Process* (AHP) para formular um mapa estratégico. A base teórica discutida sobre estratégias competitivas, o BSC e o AHP. A metodologia utilizada utilizou uma pesquisa seguida de um estudo de caso. Os resultados sugerem que as unidades de análise (pequenas empresas do segmento moveleiro) estão alinhadas com suas estratégias e indicadores; o mapa estratégico recomenda que, para se diferenciar, essas unidades invistam em servitização e *benchmarking*.



## INTRODUCTION

The commercial globalization requires industries measures and constant market positioning revisions. And with that, the need to rethink strategies, which demand analysis and understanding of the variables that affect the organizational performance. Within this context, Janeš, Kadoić and Ređep (2018) point out that organizations cannot successfully execute strategies if strategic analyzes and formulations are poor.

Small company mobilize the economy of the countries, it is because they are present and act from the manufacture of any product, to delivery to the end customer. In Brazil, for example, the values handled by these companies represent 27% of GDP, in addition to being responsible for 52% of formal jobs in the country (SEBRAE, 2014). Thus, a broader understanding of the strategic characteristics of these companies can help the development of public policies and actions (Barney, 1991). Corroborating this view, Moradi, Malekmohammad and Jamalzadeh (2018), suggest that management tools should be integrated with other resources in order to expand the understanding of phenomena. From this view, these authors using the BSC point out that it is possible that most organizations plan and elaborate their solutions with plans that achieve strategic objectives.

Also, it is important to emphasize that the strategic resources in most cases, are not distributed unevenly among companies, and in case of small these differences tend to be stable over time (Barney, 1991). In this sense, understanding how sustainable sources can generate competitive advantages, it is important issue to be managed by decision makers. For Álvarez Pérez, Rodríguez Montequín, Ortega Fernández and Villanueva Balsera (2017), in today's competitive world, only companies that observe and understand their customers' needs and provide satisfaction can compete with others and obtain benefits.

With corroborative character, both organizations compete for resources, and by customers, and therefore have no need to review the decisions, evaluate results and plan actions that could raise its market share. Understanding the behavior of organizational performance, in this context, it can be seen as a complex task. This is due to the high number of prospects to be analyzed, which when compared pairwise may indicate a behavior and to change the order comparative results may be different (Bentes, Carneiro, Silva, & Kimura, 2012).

Furthermore, because the organizational management implications and peculiarities, proper choice of performance measurements to align the competitive strategies can lead to improved performance of the company (Bentes, et al., 2012). Thus, the strategic mapping of needs and business expectations can help both in planning and in the management of organizational performance. Thus, the strategic mapping of business needs and expectations can help in planning and managing organizational performance. González, Quezada and Palominos (2019) agree with this view by stating that the development of strategic maps provides an expansion of the market share, as it is a largely introspective exercise. In addition, these authors also emphasize that cause-effect relationships are represented in only one direction, making it necessary to use tools that promote a broad discussion, with several links and, in several directions.



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With the above, the Balanced Scorecard (BSC) emerges as a business tool vision and overall performance of an organization, translating the mission, vision and strategies for the company's goals. From these objectives, specific measures can be derived in order to achieve the goals set (Giannopoulos, Holt, Khansalar & Cleanthous, 2013). The BSC integrates financial and non-financial with other key performance indicators around customer perspectives, financial, internal business processes and organizational growth, learning and innovation (Bentes, et al., 2012).

Although the use of different perspectives can better to base decision-making situations where there is a need to assign different priorities to each prospect and performance indicators may be avoiding results that do not consider the judgment of experts under a multicriteria view (Bentes, et al., 2012, Haddadi & Yaghoobi, 2014). Thus, many researchers propose integrated solutions based on multi-criteria methods in order to improve the results of the BSC method, the analysis of the relationship between the four perspectives (Bentes, et al., 2012, Kohneh, Yazdani & Kamalian, 2013, Quezada, Palominos & Gonzalez, 2013, Sundharam, Sharma & Thangaiah, 2013).

Considering the above assumptions, a multidimensional approach is required, in the present study, the multicriteria method Analytic Hierarchy Process (AHP) was selected to be used because of its ability to use in everyday problems, in that the association of opinions in the search for alternatives and decision making is necessary (Gonçalves & Assumpção, 2014).

The contribution of this study is based on the attempt to indicate a generic solution for measuring organizational performance in small businesses. Therefore, it is presented a multidimensional approach to development of strategy maps through the BSC-AHP integration. So, it is expected to provide conditions (i) to evaluate multiple scenarios; (ii) prioritize scenarios; (iii) synthesizing and reviews; (iv) classification of alternative performance level. To validate this approach will be made an application in the furniture segment.

## COMPETITIVE STRATEGY: BSC AND STRATEGIC MAPS AS MANAGEMENT TOOLS

The competitive strategy can be understood as a set of necessary decisions to support organizational goals within a specific business (Grigoroudis, Orfanoudaki, & Zopounidis, 2012). Thus, the market share of a company within its area of operation can determine if their profitability is above or below the average sector (Hansen, Herrmann, Becker, & Santos, 2014). In today's globalization era, according to Darmayana, Sulisty and Aisha (2018), a business environment is constantly created, which leads to the need to review management principles, used by companies to survive and grow.

Thus, according to the demand, the development of their own strategies for the company to relate to this niche market, passes be necessary and should be established a particular configuration of technology, structure and process that is consistent with organizational objectives (Hansen, et al., 2014). This stance is not always so accessible to perform. For González, et al., (2019), it is important to emphasize that the strategic objectives are specific to each organization. These authors also emphasize that mechanisms and tools that lead to the



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understanding of business needs should be used in conjunction with methods and techniques that promote the integration of opinions and clarification of ideas.

This not only makes complex actions, but obscures the causal chain that goes from the competitive environment for the activities of position to the skills of employees and the organization (Porter, 1991). In this context, generic strategies are indicated to deal with the various scenarios that the company needs to manage. Such strategies are classified by the leadership for cost, differentiation and market focus, and they can be used individually or combined (Porter, 1991). This view by Porter, according to Taghipour, Vosough, Azizi and Abdi (2018), can currently be attributed to the need to constantly monitor market trends and to optimize the use of resources.

The scope of success of competitive strategy adopted by the company, in most cases, is associated with the monitoring of environmental change, social and economic (Oliveira, Salazar, Crespo, Costa & Kovacs, 2015). For this reason, it is important to maintain efficient communication channels associated with new information technologies with the business stakeholders, and maintain a monitoring of the movements of their competitors (Oliveira, et al., 2015). Within this context, Pinto, Tonini, Yoo and Katayose (2020), signal that the current competitive environment poses new challenges for organizations, valuing those that are able to effectively add value to their customers.

Thus, aligning the needs of the market, the competitive strategies of the company, should be performed according to the setting and the horizon of organizational planning. In Teeratansirikool, Siengthai, Badir e Charoenngam (2013) opinion due to the risks inherent in the survival of businesses, increase due to the gaps between theory and practice of the strategies adopted in these conditions reinforces once again the importance of business planning and strategic alignment (Agostini, Filippini & Nosella, 2015).

The global changes that have taken place in the world economy determine the priority of knowledge and intellectual capital as the main drivers of the sustainable economic growth of contemporary companies (Johnson, 2017). In addition, the formation of post-industrial economic relations can be seen as an evolutionary and systematic process that demonstrates intrinsic differences between traditional and innovation-oriented commercial development (Wu, 2012). The physical capital of companies (tangible assets), which was significant for the traditional type of business organization and management, became secondary to information and managerial innovation (Kohneh, et al., 2013). Consequently, new tasks and actions on business development management, which are based on a constant adjustment to the demand profile, increase (Nascimento, Bortoluzzi, Dutra & Ensslin, 2011).

This adjustment to the demand profile requires companies to try to restart customer needs, market trends and their own identity (Moradi, et al., 2018). Corroborating with this thinking, Sainaghi, Phillips and d'Angella (2019), strategic alignment mechanisms are based mainly on intangible relational resources, which play a fundamental role in creating positive collaboration between companies. Although competition exists, in the customer's view, the choice is always healthy and necessary, therefore, according to Feo and Giove (2019), companies must be aware



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of the existence of a market segmentation that meets expectations, whether of customers, or companies.

Efficient business management under contemporary conditions has become a complex task. Within this task, managers should not only identify external environment capabilities, but also seek internal growth (Quezada, et al., 2013). When performing this search, the manager must consider the evolution of the company and possible threats to the development of the company (Gonçalves, Gonçalves & Oliveira, 2014). With this, the Balanced Scorecard technique can be seen as suitable for building and structuring business enterprise management, helping to map strategic paths, as well as collaborating for long-term development (Grigoroudis, et al., 2012).

The Balanced Scorecard (BSC) is able to express the vision and strategies of an organization in terms of performance indicators. Thus, companies transform intangible elements in goals and tangible goals, allowing the measurement management system efficiency (Giannopoulos, et al., 2013, Kaplan & Norton, 1992). Thus, Oliveira, Guilarducci and Antonialli (2017) highlight that the BSC is a tool with managerial potential, which assists managers in their decision making, in order to transform the organizational strategy into performance indicators. Something that according to these authors, in the moder world is essential for business survival. However, the main point is that, although it has complex construction and, therefore, several projects overlap and are interdependent, according to Malagueño, Lopez-Valeiras and Gomez-Conde (2018), the BSC is able to help promote efficiency as a prerequisite for the successful development of innovations.

Since the creation of the BSC, Kaplan and Norton (1992), have talked about the importance of performance measurement for the translation of organizational strategy. Thus, the BSC can be seen as a performance measurement tool and as a method of evaluating the strategy or communication tool with hierarchical levels of the company (Grigoroudis, et al., 2012). In practice, for Jovanovic and Krivokapić (2015), the selection of measures in the implementation of the Balanced Scorecard usually occurs because, in this case, everything starts with a general map, where the interdependence of four perspectives is represented. However, these authors emphasize that, due to both an internal dependence on elements within a component, and an external dependence on elements between perspectives and their elements, there is a need to consolidate opinions in the formation of this map.

The BSC is grounded in four perspectives, and they customer perspective the, internal business processes, learning and growth and financial (Kaplan & Norton, 1992). The customer perspective seeks to identify the niche market in which the organization operates, in addition to the performance achieved, the internal business processes takes into account the most important processes of the organization, which have a direct impact on customer satisfaction, as the learning and growth focuses on the development of human capital of the organization and all the resources necessary to maintain this long-term growth, finally, the financial perspective covers the profitability of the organization, pointing out the results to be achieved (Kohneh, et al., 2013).

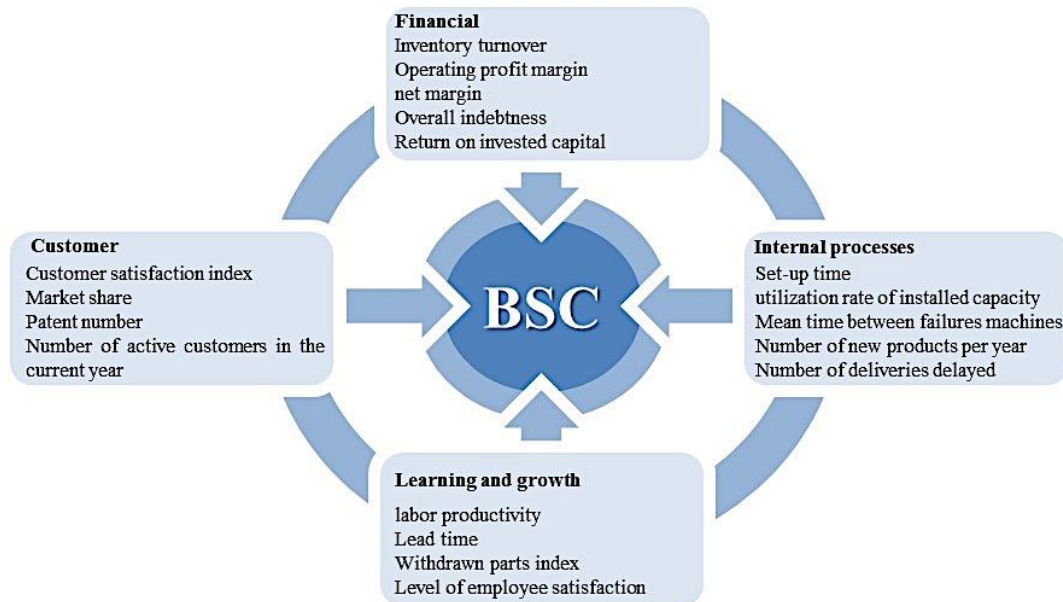
In this context, each perspective is measured through performance indicators adopted by the company. These are important because they generate the current success of vectors and future



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of the organization (Kaplan & Norton, 1992). Corroborating the purpose of this study, (Wu, 2012) lists indicators that can be applied to small businesses (manufacturers and service providers), while Nascimento, et al. (2011) presents a performance indicator selection used in the furniture sector, an overview of these indicators is shown in Figure 1.

**Figure 1.** Strategic decision framework



Source: Nascimento, et al., (2011).

Complementarily, as the BSC implementation of product strategy maps cover the four perspectives analyzed, representing the relationship of cause and effect between the strategic elements of an organization (Gonçalves, et al., 2014). Thus, the strategy map displays dynamically, vision and objectives in goals format, which in the long term can assist the effectiveness of the organizational strategy (Quezada, et al., 2013). However, this effectiveness needs to be periodically reviewed, and with that, the use of tools that help to visualize broadly scenarios, and that consider the opinion of different stakeholders (Llach, Bagur, Perramon, & Marimon, 2017) becomes essential. For Reynolds, A., Fourie, H., & Erasmus, L. (2019), Multi-Criteria Decision Aiding (MCDA) serve this purpose, in addition to considering judgments from stakeholders and experts, they provide conditions for analysis and visualization of expressions that narrow possible gaps in the construction of strategic maps.

## MULTICRITERIA METHODS AS AID TO DECISION MAKING: THE ANALYTIC HIERARCHY PROCESS

In several problems, decision-making on a set of alternatives is based on different evaluation criteria, which are organized in a hierarchical structure (Saaty, 1977). According to Saracoglu (2016), such hierarchy is a decomposition of the primary objective into dimensions, which are then analyzed in subdimensions, down to the lowest level of the hierarchy (Bentes, et al., 2012). This type of approach, according to Gonçalves, et al. (2014), allows to organize the decision problems that follow this hierarchical scheme. For these authors, this organization is useful in



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situations that require consideration of sets of criteria with a large number of elements and which describe different aspects of the problem in question.

In the literature, Multi-Criteria Decision Aiding (MCDA) techniques are widely used in decision problems that have several sets of criteria and that need to point to an alternative as the "best possible solution" or to perform a hierarchy of alternatives, making the process more explicit, rational and efficient (Angilella & Mazzù, 2015, Gonçalves, 2016, Metaxas, Koulouriotis, & Spartalis, 2016, Saracoglu, 2016). The MCDA is a multidisciplinary field, derived from Operational Research, which uses mathematical approaches to deal with complex problems encountered in human activities or actions (Gonçalves, 2016). Nowadays, it also integrates intelligence techniques and economic well-being techniques, for example: ELimination and Choice Expressing REality (ELECTRE) I, II and III; Technique for Order Preference by Similarity to Ideal Solution (TOPSIS); Preference Ranking Organization METHod for Enrichment Evaluations (PROMETHEE); VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR); among others.

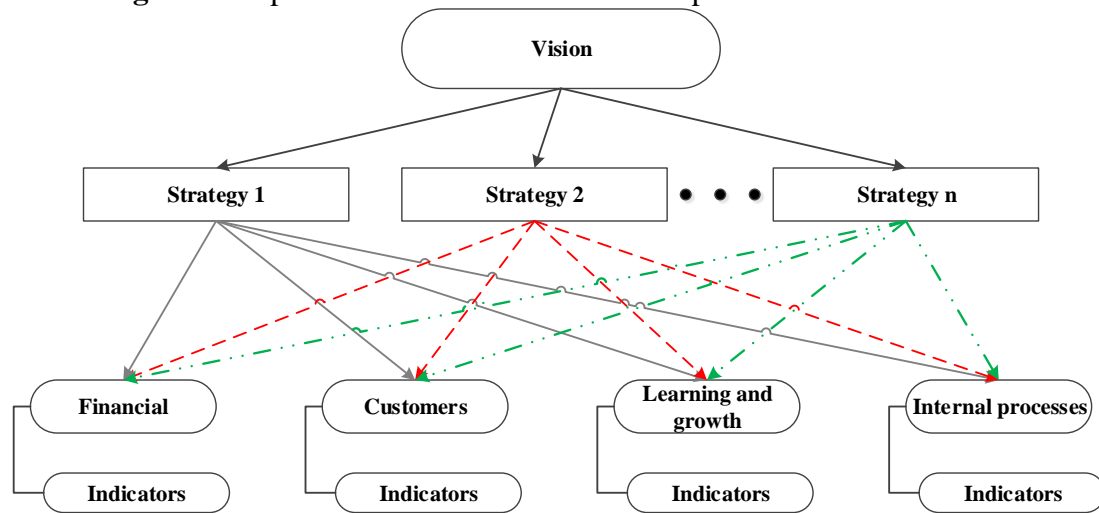
In this work the Analytic Hierarchy Process (AHP) was selected as an information integrating tool and, with this, contribute to the elaboration of a strategic map. This choice occurred due to the operational flexibility of this method, which allowed to carry out relative evaluations through pairs of criteria comparing possible alternatives (Quezada, et al., 2013, Sundharam, et al., 2013, Gonçalves, 2016).

The Analytic Hierarchy Process (AHP) was developed by Tomas Lorie Saaty in the 70's and covers problems with dimensions, scenarios and different criteria, considering qualitative and quantitative variables (Bentes, et al., 2012). Like the human brain, when faced with AHP a high number of elements in complex situations, it performs a grouping, in the most common features among them, following a hierarchical process step (Saaty, 1977). As shown by Gonçalves and Assumpção (2014), the process for applying the AHP consists of three steps analytical thinking (construction of the hierarchy, prioritization and analysis logical consistency priority), through which the problem is structured judged and analyzed.

From the consideration that the business environment is constantly changing, having variables and complex combinations in an integrated modeling of the BSC to the AHP, a four-level hierarchy can be established, in order to structure the evaluation of performance (Bentes, et al., 2012). In general, the hierarchy consists of the general objective factors, sub-factors and alternatives (Gonçalves & Assumpção, 2014). In the case of BSC-AHP structure shall be: vision of the organization; organizational strategies, BSC perspectives and performance indicators (Bentes, et al., 2012, Gonçalves & Assumpção, 2014). According to Bentes, et al., (2012), the AHP uses parity comparisons, which are made with elements of the same hierarchical level focused on an element at the level immediately below (Figure 2).



**Figure 2.** Representation of the hierarchical operationalization of AHP



Source: Bentes, et al., (2012).

As proposed by Saaty (1977) and, used in studies involving advanced decision making, quantification of the priorities (weights) of the model is performed using the experience of a judging team (consisting of  $K$  judges), to establish the relationship between each pair of objects and circumstances under a certain focus, Saaty according to the scale presented in Table 1. In summary, this scale determines the importance of alternative  $i$  with respect to alternative  $j$ , expressed by  $a_{ij}$ . When the comparison is reversed, or alternative  $j$  compared to the alternative  $i$ , it is expressed by  $1/a_{ij}$ . The conversion used between numeric and verbal scales presented in Table 1 is a form of psychometric scale, developed by Saaty (1977) and is the most used and recommended in problems involving the AHP (Bentes, et al., 2012, Kohneh, et al., 2013, Quezada, et al., 2013, Sundharam, et al., 2013, Gonçalves & Assumpção, 2014, Gonçalves, et al., 2014).

**Table 1.** Numerical scale for AHP operation

Intensity	Verbal scale
1	Equal Importance
3	Moderate importance
5	Strong importance
7	Importance very strong
9	Extremely importante
2, 4, 6, 8	Intermediate values

Source: Saaty (1977).

Along the comparisons is generated a generic judgments matrix  $n \times n$ , in which  $n$  is the number of elements within the matrix, and in this case corresponds to the number of alternative strategies and inserted into the hierarchy. Table 2 presents a judgments matrix model.





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**Table 2.** Example of judgements matrix

Attributes	Attribute 1	Attribute 2	. . .	Attribute N
Attribute 1	1	$1/a_{21}$	. . .	$1/a_{n1}$
Attribute 2	$a_{21}$	1	. . .	$1/a_{n2}$
. . .	. . .	. . .	. . .	. . .
Attribute N	$a_{n1}$	$a_{n1}$	. . .	1

Source: Saaty (1977).

It is worth emphasizing that, for quantitatively reliable values, a minimum of “*MJ*” judgments are required, which can be obtained through Equation 1 (Saaty, 1977).

$$MJ = \frac{n(n-1)}{2} \tag{1}$$

With that, the trials are taken from the *K* evaluators and used the geometric mean of the values to unify the assigned weights. That way they are maintained the characteristics of the weights and their reciprocal (Saaty, 1977).

However, as highlighted out by Gonçalves and Assumpção (2014), the parity judgment should be normalized. To this end, you have added the elements of each column of the test array, so each element is divided by the sum of the respective column values. This was done by averaging the standard table rows. Even following this rationale, it is necessary to determine the logical consistency of the data generated (Saaty, 1977), which is performed by using the Consistency Ratio of trials (*CR*), calculated by Equation 2.

$$CR = \frac{CI}{RI} \tag{2}$$

It *CI* is the Consistency Index and, *RI* represents the Random consistency Index found for a reciprocal matrix of *n* order. The consistency index may be obtained by the Equation 3, however, it is possible to note that the smaller the value, the higher the reliability of the results.

According to Saaty (1977), *CR* must meet the  $CR \leq 0,1$  condition. Wherein  $\lambda_{max}$  is the largest eigenvalue of the matrix of judgments.

$$CI = \frac{(\lambda_{max} - n)}{(n-1)} \tag{3}$$

**METHODS AND RESEARCH TECHNIQUES**

This study presents a multidimensional approach to development of strategy maps through the BSC-AHP integration and for validation of this approach were used as units of analysis fifteen small companies in the furniture segment. Respondents were business owners and managers of the production and management of this segment, totaling 35 respondents. Regarding the psychometric characteristics of the data collection instrument, generally, presented in favor. The Cronbach's alpha of 0.86 indirectly indicates good understanding on the part of respondents. Moreover, the load factors were significant, with moderate to strong forces, as well as Pearson's correlation significance which showed less than 0.001 between the most items. There were no outliers and missing values to be considered. Thus, to develop strategic map



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based on marketing realities of small businesses in the furniture segment, five steps were developed based on the methods proposed by (Bentes, et al., 2012, Gonçalves & Assumpção, 2014).

The first stage was carried out diagnosis of the internal and external environment of the analysis units, checked products offered, organizational processes, customers, competitors, suppliers, and social and economic aspects. This step aimed to generate knowledge about the small segment of the furniture companies, in order to base of the subsequent steps.

In order to identify business strategies, it was held in the second stage. In this sense, from the perspective of the units of analysis, strategies have been identified from the perspective of entrepreneurs and managers of these units. The third step aimed at the characterization of AHP performance indicators and development of hierarchical structure related to each perspective of the BSC, based on the literature (Barney, 1991, Kaplan & Norton, 1992, Bentes, et al., 2012, Sundharam, et al., 2013) and interviews with business owners and managers.

The identification of prospects and strategies weights is carried from the formation of the formed hierarchical structure (fourth stage), it passes possible to determine the weights of each of the items. From this structure and the assessments of entrepreneurs and managers, Expert Choice Demo software was used to operationalize the use of AHP.

The fifth step carried out a verification of the strategies, prospects, performance indicators to draw up the strategic map. Thus, from the headquarters of judgment obtained by AHP, information could be extracted that define the strategic positioning of the companies surveyed, as well as form of measurement of organizational performance that best suits them.

## RESULTS

When performing the first step was possible to condense a generic profile for the development of vision and other information to prepare the strategic map. Thus, in the second stage are identified strategies of analysis units. In result, performance indicators were characterized in the third stage (Table 3), to form the hierarchical structure (Figure 3).

**Table 3.** Components of the hierarchical structure of the company under study

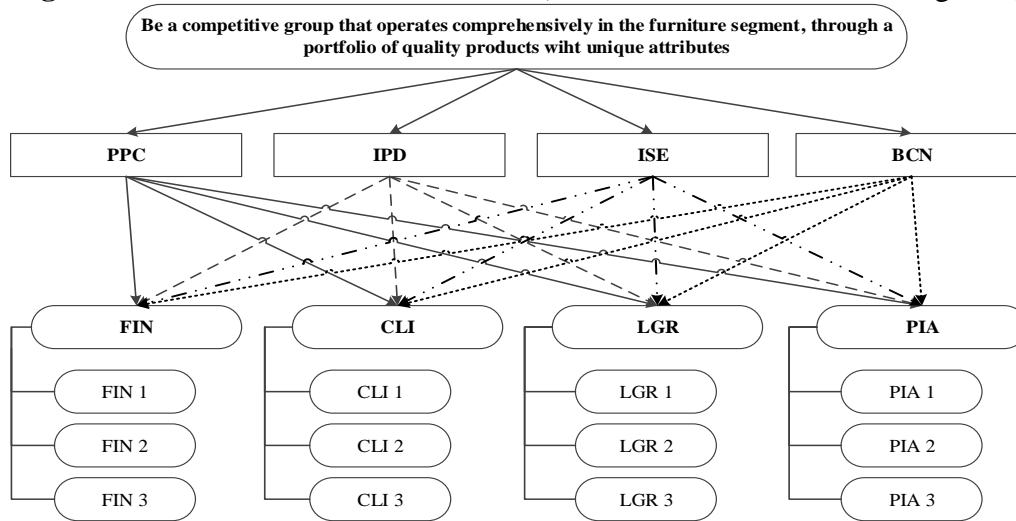
<b>Vision</b>	
Be a competitive group that operates comprehensively in the furniture segment, through a portfolio of quality products with unique attributes.	
<b>Strategy</b>	
Planning and production control (PPC) Innovation in products (IPD) Innovation in services (ISE) Benchmarking contemporary (BCN)	
<b>Perspective</b>	<b>Indicators</b>
Client (CLI)	– Customer satisfaction index (CLI 1); – Satisfaction index of architects/designers (CLI 2); – Market share (CLI 3).
Financial (FIN)	– Net margin (FIN 1); – Overall indebtness (FIN 2); – Return on invested capital (FIN 3).
Learning and growth (LGR)	– Lead time (LGR 1); – Rework index (LGR 2); – Employee satisfaction index (LGR 3).
Processes of internal affairs (PIA)	– Mean time between failures machines (PIA 1); – New products per year Index (PIA 2); – Deliveries Index overdue (PIA 3).

Source: Authors.



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**Figure 3.** Generic Hierarchical structure (small businesses - furniture segment)



Source: Authors.

The judgments of the perspectives and strategies were made by business owners and managers, based on the defined generic hierarchical structure (Figure 3), reaching weights of each attribute (fourth stage). Table 4 shows the weights for each strategy, as well as inconsistency matrix linked to the comparison matrix. Thus, the trials showed a low degree of inconsistency, that is, a consistency ratio lower than the specified maximum ( $RC < 0.1$ ). The results achieved corroborate with Oliveira, et al., 2017, which suggest the existence of coherent views of the company-market relationship. And, for that reason, it becomes necessary to expand the strategic business perception (Reynolds, et al., 2019).

**Table 4.** Weights strategies and inconsistency related to the comparison matrix

Strategy	Weight	Inconsistency
Planning and production control (PPC)	0.417	
Innovation in products (IPD)	0.416	
Innovation in services (ISE)	0.122	0.080
Benchmarking contemporary (BCN)	0.045	

Source: Authors.

The overall weight of each strategy, and its contribution to the overall objective can be attested by reason of consistency and is an important indication for ordering the BSC. Regarding the strategies of "planning and control of production" and "product innovation", these can be highlighted as key in the preference of businessmen and managers (Table 4). Tables 5 to 8 show the weights of the prospects for each defined strategy, related inconsistency beyond each set of trials. Extremely important points in the construction of a strategic map, being something that contributes not only to the elaboration of plans, but also, in the measurement of operational actions (Taghipour, et al., 2018).

**Table 5.** Weights of perspectives on the Strategy 1 (PPC)

Perspective	Weight	Inconsistency
Financial	0.053	
Client	0.442	
Learning and growth	0.265	0.090
Process internal business	0.240	

Source: Authors.



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**Table 6.** Weights and inconsistency of perspectives on the Strategy 2 (IPD)

Perspective	Weight	Inconsistency
Financial	0.115	
Client	0.717	
Learning and growth	0.053	0.060
Process internal business	0.118	

Source: Authors

**Table 7.** Weights and inconsistency of perspectives on strategy 3 (ISE)

Perspective	Weight	Inconsistency
Financial	0.069	
Client	0.496	
Learning and growth	0.226	0.070
Process internal business	0.209	

Source: Authors

**Table 8.** Weights and inconsistency of perspectives on the Strategy 4 (BCN)

Perspective	Weight	Inconsistency
Financial	0.056	
Client	0.647	
Learning and growth	0.144	0.100
Process internal business	0.153	

Source: Authors

The Financial Perspective (0.053) can be seen as a criterion of less relevance in the opinion of decision-makers (Table 5). And from this, performance measures related to the strategic level, which aim to verify the income, have been considered less important than measures on tactical and operational levels. Another issue is that there is indication that such performance measures, conjecture the performance of the strategic level for the long term. Something that, according to Pinto, et al., (2020), has a direct impact not only on corporate health, but also on market segmentation. However, it may also be noted that the performance measures related to the operational level, take precedence over tactical. This indicates that such measures can play a greater role than the same intermediate level of management. This behavior can help understand why the tactical level, in general, plays a connecting role and thus contributes to the achievement of the objectives of the strategic level through the operational level.

To Porter (1991), small companies with generic strategy of differentiation with market focus, have in most cases, financial success from growth or balancing the perspectives of BSC. However, the market segment of study units has a narrow niche with organizational strategies that drive market differentiation and may, therefore, explain the representation of the financial perspective. This result confirms the indications of Reynolds, et al., (2019), who further emphasizes that this perspective is not only essential to the market segment studied, but also is a limiting factor for investments and innovation in most cases.

However, the Customer perspective has featured in all strategic scenarios surveyed (Tables 5 to 8) and can be considered an important element for direct actions for programming and production control, product innovation and services, and benchmarking contemporary. On the other hand, it is noteworthy that the demand satisfaction is linked to the potential for innovation and production. These results agree with Malagueño, et al., (2018) suggesting an adequate



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research to market experience. Something that, for these authors, must be one of the mainstays of any market segment.

To synthesize, it can be seen that the weights and inconsistencies (Tables 5 to 8) are comparable in the strategic, tactical and operational levels, and are in accordance with Gonçalves and Assumpção (2014), provide elements that help in the strategic map of formulation. The results justify the need to carry out synchronization of internal operations regarding programming and production control, product innovation and services, and contemporary benchmarking. The strategy map was drawn from the organizational performance indicator analysis (Table 9), which were associated with the strategic objectives set by management.

**Table 9.** Weights and inconsistencies of performance indicators

Indicator	Weight	Inconsistency
<b>Customer</b>		
Customer satisfaction index	0.400	
Satisfaction index of architects/designers	0.350	0.060
Market share	0.250	
<b>Financial</b>		
Net margin	0.240	
Overall Indebtness	0.310	0.070
Return on invested capital	0.450	
<b>Learning and Growth</b>		
Lead time	0.420	
Rework index	0.280	0.090
Satisfaction level of employees	0.300	
<b>Processes of Internal Affairs</b>		
Mean time between failures machines	0.250	
New products or index per year	0.390	0.060
Deliveries index overdue	0.360	

Source: Authors.

Weights and inconsistencies presented by the performance indicators of the units of analysis (Table 9) indicate the existence of importance of balance between these indicators, stressing the need to use them together in drawing up the strategic map.

In case, the customer perspective is also linked to customer satisfaction, architects and designers, since the growth of market share, is presented as confirmation of the favorable outcome of the two other indicators this perspective. This result is in line with market practices and expectations, as pointed out by Moradi, et al., (2018), in the dimension of the client, the company's market shares and clients are determined. And, based on this, the organization's performance can be assessed to meet customer satisfaction, making it possible to increase market share.

The indicators adopted in the financial perspective show that the company has achieved satisfactory results in the medium and long term, a factor that is aligned with the strategies adopted by it. This result, according to Reynolds, et al., (2019) provides conditions for making



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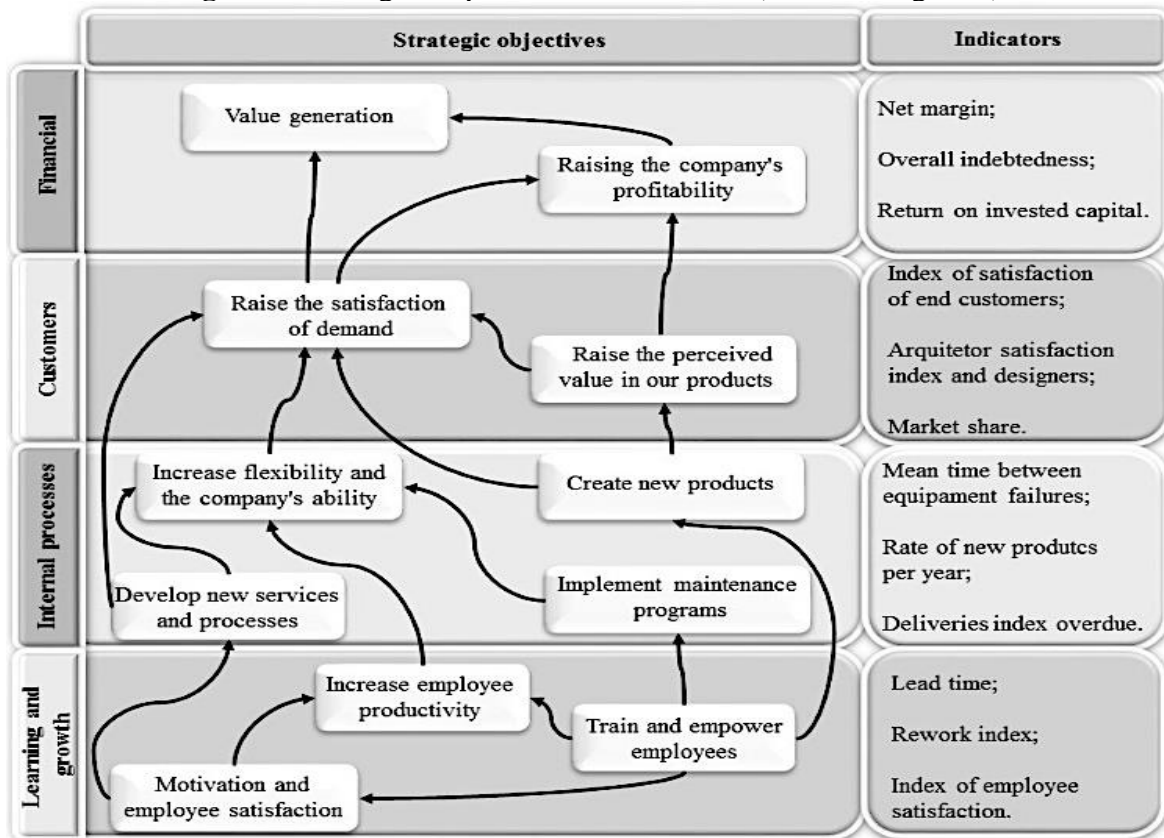
a high-quality product available to customers, and can thus form a basis to promote the relationship with the customer, considered essential for organizational success.

Regarding the learning and growth perspective, this indicates be strengthened by the need to maintain the sales and production aligned in their strategies and actions. This can be sustained by checking the necessity of reduced lead time and rework rate, which have weights so close as to the aforementioned strategies. This, according to Álvarez Pérez, et al., (2017) highlights the importance of this indicator, because it provides evidence about the meaning of human factors in the development of products and solutions, where human capital plays a very important essential role.

The perspective of internal business processes, they are also emphasized the importance of innovation strategies in products and production planning and control. In this regard it was identified critical processes, which allowed conditions to prepare proposals and customer value stocks, aiming to attract and retain new customers. These findings corroborate with González, et al., (2019), which raise the importance of understanding the information and prerogatives of this perspective, since important points such as the internal position (strengths and weaknesses), become known with rigor of details about different angles and views.

Thus, by integrating the data found, it becomes feasible to build the strategic map of the organization, shown in Figure 4. In this, there is a clear relationship between the indicators and strategic objectives in order to effectively achieve the strategy proposed by the company, which concludes Step 5.

**Figure 4.** Strategic map for small businesses (furniture segment).



Source: Authors.



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Due to the BSC vary greatly, creating formal processes to collect data can be seen in small organizations as an additional administrative burden (unjustifiably). However, in this study the results suggest that informal processes for data collection, work well in small organizations, due to non-identification of informants, and consequently stimulating contribution to the BSC construction process.

Finally, the authors would like to emphasize that the robustness of a structured methodological approach to implementation of the BSC, has significant importance for small businesses, which in general, have limited resources and constant need for business expansion. Thus, small businesses can create levels of implementation of the BSC, which may allow cost savings, therefore, the methodology proposed in this work can be adapted to different scenarios.

## CONCLUSIONS

This study is part of the BSC tool and AHP to provide a multidimensional approach to development of strategic map for small businesses. While the BSC explicitly incorporates perspectives that in this proposal go beyond the usual financial point of view, the AHP handles multiple perspectives and measures with varying degrees of importance, and translates the overall result in a unified metric. Being a multicriteria method, AHP uses qualitative data, transforming them into quantitative information through matrix weights, bypassing personhood in decisions, it has become more than an ordinal ranking, you can check the magnitude of the difference between alternatives, as well as the causes that led to such results.

Thus, the application of BSC and AHP in an integrated manner in this particular case, where discussion rounds are necessary, says the fact that the strategic organizational mapping is a complex and multifaceted phenomenon. Because of seasonality that cause changes in the market, business owners and managers need to employ approaches to strategize, to consider the business multidimensionality.

The results suggest that the units of analysis (small businesses in the furniture segment) are aligned with their strategies and indicators. However, it was found that in order to remain on the market these companies must meet deadlines with quality products and to maintain high innovation rate. The strategy map recommends that to differentiate themselves, the units of analysis should invest in servitization and contemporary benchmarking, i.e., in addition to adding new services, it is necessary to seek new knowledge, skills and competencies.

The small businesses face increasing pressures (external and internal) to apply emerging business initiatives for sustainable and competitive manner. Knowledge resources, which can be recognized as the source of competition must be analyzed by qualitative and quantitative methods. This can be attributed to the fact that knowledge is stochastic, by constantly changing over time, according to human experience and learning processes.

Thus, future studies can consider the stochastic nature of existing knowledge in the business environment and employ techniques and methods to consider this phenomenon as artificial intelligence systems, optimization techniques and structural equation modeling.



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## REFERENCES

- Agostini, L., Filippini, R., & Nosella, A. (2015). Management and performance of strategic multipartner SME networks. *International Journal of Production Economics*, 169, 376-390.
- Álvarez Pérez, C., Rodríguez Montequín, V., Ortega Fernández, F., & Villanueva Balsera, J. (2017). Integrating analytic hierarchy process (AHP) and balanced scorecard (BSC) framework for sustainable business in a software factory in the financial sector. *Sustainability*, 9(4), 486-501.
- Angilella, S., & Mazzù, S. (2015). The financing of innovative SMEs: A multicriteria credit rating model. *European Journal of Operational Research*, 244(2), 540-554.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.
- Bentes, A. V., Carneiro, J., Silva, J. F., & Kimura, H. (2012). Multidimensional assessment of organizational performance: Integrating BSC and AHP. *Journal of Business Research*, 65(12), 1790-1799.
- Darmayana, R. A., Sulisty, B., & Aisha, A. N. (2018). Designing Performance Measurement Instrument With Balance Scorecard Framework And Ahp Method (case Study At Pt. Bina Karya Persero). *e-Proceedings of Engineering*, 5(3), 6606-6617.
- Feo, R., & Giove, F. (2019). Towards an efficient segmentation of small rodents brain: a short critical review. *Journal of neuroscience methods*, 323, 82-89.
- Giannopoulos, G., Holt, A., Khansalar, E., & Cleanthous, S. (2013). The use of the Balanced Scorecard in Small Companies. *International Journal of Business and Management*, 8(14), 1-22.
- Gonçalves, W. (2016). *Integração de Técnicas de Análise Multivariada e Método Multicritério para Localização de Centros de Distribuição*. Tese de doutorado, Universidade Metodista de Piracicaba, Santa Bárbara d'Oeste, SP, Brasil.
- Gonçalves, W., & Assumpção, M. R. P. (2014). Location of Distribution Center in secondary zone: proposal of a method by Analytic Hierarchy Process (AHP). *Espacios*, 35(11), 17.
- Gonçalves, W., Gonçalves, W., & Oliveira, L. P. F. (2014). Strategic mapping through the Balanced Scorecard (BSC): The Case of Small Business of Building Materials. *Espacios*, 36(7), 4.
- González, M. A., Quezada, L., & Palominos, P. (2019). Designing a balanced scorecard using a scenario approach. *Academia Revista Latinoamericana de Administración*, 32(2), 118-137.
- Grigoroudis, E., Orfanoudaki, E., & Zopounidis, C. (2012). Strategic performance measurement in a healthcare organization: A multiple criteria approach based on balanced scorecard. *Omega*, 40(1), 104-119.





Citação (APA): Demuner, M. T., Zatta, F. N., Freitas, R. R. de, & Goncalves, W. (2020). Multidimensional approach to elaborate strategic map in small businesses through the integration BSC-AHP. *Brazilian Journal of Production Engineering*, 6(3), 57-74.

Haddadi, F., & Yaghoobi, T. (2014). Key indicators for organizational performance measurement. *Management Science Letters*, 4(9), 2021-2030.

Hansen, P. B., Herrmann, J. D., Becker, G. V., & Santos, J. L. S. (2014). Strategic Behavior Analysis of Small Business in Brazil. *FAEDPYME International Review*, 3(5), 30-42.

Janeš, A., Kadoić, N., & Begičević Ređep, N. (2018). Differences in prioritization of the BSC's strategic goals using AHP and ANP methods. *Journal of Information and Organizational Sciences*, 42(2), 193-217.

Johnson, H. T. (2017). The tragedy of modern economic growth: A call to business to radically change its purpose and practices. *Accounting History*, 22(2), 167-178.

Jovanovic, J., & Krivokapić, Z. (2015). AHP in implementation of Balanced Scorecard. *International Journal for Quality Research*, 2(1), 59-67.

Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard. *Harvard Business Review*, 70(1), 71-79.

Kohneh, A. V. M. A., Yazdani, B. O. Y., & Kamalian, A. (2013). Performance measurement in governmental agencies using BSC-AHP: A case study of Civil Registry Office in Tehran. *Management Science Letters*, 3(4), 1255-1260.

Llach, J., Bagur, L., Perramon, J. and Marimon, F. (2017). Creating value through the balanced scorecard: how does it work?. *Management Decision*, 55(10), 2181-2199.

Malagueño, R., Lopez-Valeiras, E., & Gomez-Conde, J. (2018). Balanced scorecard in SMEs: effects on innovation and financial performance. *Small Business Economics*, 51(1), 221-244.

Metaxas, I. N., Koulouriotis, D. E., & Spartalis, S. H. (2016). A multicriteria model on calculating the Sustainable Business Excellence Index of a firm with fuzzy AHP and TOPSIS. *Benchmarking: An International Journal*, 23(6), 1522-1557.

Moradi, N., Malekmohammad, H., & Jamalzadeh, S. (2018). A Model for performance evaluation of digital game industry using integrated AHP and BSC. *Journal of Applied Research on Industrial Engineering*, 5(2), 97-109.

Nascimento, S., Bortoluzzi, S. C., Dutra, A., & Ensslin, S. R. (2011). Mapping of organizational performance indicators in research in the fields of Management, Accounting and Tourism from 2000 to 2008. *Revista de Administração (FEA-USP)*, 46(4), 373-391.

Oliveira, T. D., Guilarducci, C. A., & Antonialli, L. M. (2017). Balanced scorecard: um estudo bibliométrico da produção acadêmica na última década no Brasil. *Revista Vianna Sapiens*, 8(1), 26-44.

Oliveira, B. R. B., Salazar, V. S., Crespo, P. M., Costa, C. S. R., & Kovacs, E. P. (2015). Competitive strategy in small enterprises: dimensions of the strategic process and their associations with generic and functional strategies. *Gestão & Produção*, 22(1), 119-132.

Pinto, S. H. B., Tonini, A. C., Yoo, N. S. L., & Katayose, E. M. (2020). Strategic Management through Balanced Scorecard (BSC): Deployment in Brazilian Companies. *Brazilian Journal of Business*, 2(1), 564-580.

Porter, M. E. (1991). Towards a dynamic theory of strategy. *Strategic Management Journal*, v. 12(S2), 95-117.

Quezada, L. E., Palominos, P. I., & Gonzalez, M. A. (2013). Application of AHP in the Design of a Strategy Map. *iBusiness*, 5(3B), 133-137.



Citação (APA): Demuner, M. T., Zatta, F. N., Freitas, R. R. de, & Goncalves, W. (2020). Multidimensional approach to elaborate strategic map in small businesses through the integration BSC-AHP. *Brazilian Journal of Production Engineering*, 6(3), 57-74.

Reynolds, A., Fourie, H., & Erasmus, L. (2019). A generic balanced scorecard for small and medium manufacturing enterprises in South Africa. *The Southern African Journal of Entrepreneurship and Small Business Management*, 11(1), a193.

Saaty, T. L. (1977). A scaling method for priorities in hierarchical structures. *Journal of Mathematical Psychology*, 15(3), 234-281.

Sainaghi, R., Phillips, P., & d'Angella, F. (2019). The balanced scorecard of a new destination product: Implications for lodging and skiing firms. *International Journal of Hospitality Management*, 76, 216-230.

Saracoglu, B. O. (2016). A PROMETHEE I, II and GAIA-based approach by Saaty's subjective criteria weighting for small hydropower plant investments in Turkey. *International Journal of Renewable Energy Technology*, 7(2), 163-183.

Serviço Brasileiro de Apoio às Micro e Pequenas Empresas - SEBRAE. (2014). *Participation of Micro and Small Enterprises in the Brazilian Economy*. Sebrae: Brasília.

Sundharam, V. N., Sharma, V., & Thangaiah, I. S. S. (2013). An integration of BSC and AHP for sustainable growth of manufacturing industries. *International Journal of Business Excellence*, 6(1), 77-92.

Taghipour, M., Vosough, A., Azizi, D., & Abdi, J. (2018). Insurance performance evaluation using bsc-ahp combined technique. *National Academy of Managerial Staff of Culture and Arts Herald*, (, 1158-1166.

Teeratansirikool, L., Siengthai, S., Badir, Y., & Charoenngam, C. (2013). Competitive strategies and firm performance: the mediating role of performance measurement. *International Journal of Productivity and Performance Management*, 62(2), 168-184.

Wu, H. Y. (2012). Constructing a strategy map for banking institutions with key performance indicators of the balanced scorecard. *Evaluation and Program Planning*, 35(3), 303-320.

