How Information Management and Integration Influence Strategic Performance

Full Paper

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Abstract
This work aims to analyze the influence of integration and information management capabilities on strategic business performance from a qualitative point of view. Thus, this paper presents the results of a multiple case study in three market-leaders organizations in their segment in the country (a bank, a retailer, and a manufacturer). The research model based on dynamic capabilities proposes that other organizational capabilities can measure these influences (flexibility, reconfiguration, and agility). The results of content analysis of interviews with fifteen organization's executives point to a series of connections between the two capabilities and dimensions identified in the literature. The influence observed can go through different ways to confer greater competitiveness to organizations, but there is a more consistent way with greater intensity that has been verified among the cases.

Keywords
Information Management, Integration, Capabilities, Strategic Performance

Introduction
The strategic impact of Information Technology (IT) resources is still a source of controversy in the literature on Information Systems (IS) (Chae, 2014; Luse and Mennecke, 2014; Sabherwal and Jeyaraj, 2015; Wang et al, 2014). It is a subject that continues to draw attention because of the changes in the competitive environment imposed by new digital technologies that generate new data, Big Data. The currency data flow needs to be explored and managed by the organization for strategic value extraction for organizations. This opportunity to create value for organizations in exploring Big Data has been addressed by several authors (Chen and Storey, 2012; Davenport et al., 2013; McAfee and Brynjolfsson, 2012). Developing organizational skills to cope with changes arising from new digital technologies is a competitive necessity for the survival of firms (Baradwaj et al., 2013).

As one of the capabilities to be developed, this study proposes to investigate information management capability (IMC) as a source of sustained competitive advantage (SCA). IMC, as shown in previous studies, positively impacts the performance of the firm (Carmichael et al., 2011; Mithas et al., 2011.) This impact, however, can be seen in a direct way (Carmichael et al., 2011) or mediated by other organizational capabilities (Mithas et al., 2011). IMC can be understood as the firm’s set of skills that articulate information infrastructure, the architecture of information, the access to information and its distribution that makes a possible organizational adjustment in response to the changes imposed by the internal and external environments. This construct is also being considered in the context of Big Data (Brinkhues et al., 2015; Maçada et al., 2015), demonstrating its relation to the strategic performance of the firm. Thus, it is expected that the IMC act in complementarity with other firm’s capabilities for value extraction in this context. "The research field of strategic IT is a rich source of evidence that can be used to illustrate the importance of the issue of complementarity of resources" (Wade and Hulland, 2004, p. 123).
New digital technologies enable different forms of dynamic capabilities (Pavlou and El Sawy, 2010). Therefore, it has become crucial to develop the organizational skills to extract strategic value from this extraordinary information flow (Bharadwaj et al., 2013; Demirkan and Delen, 2013). To pinpoint these capabilities, a systematic review of the literature was carried out. This search identified four capabilities (integration, reconfiguration, flexibility, and agility) related to the chosen strategic perspectives that could mediate the impact of IMC and IT Integration Capability on the strategic performance of the company.

Therefore, this work seeks to understand the influence of the complementarity between IMC and IT Integration Capability on the firm’s strategic performance. For this, this paper presents the results of a multiple case study in a financial institution with intensified use of data, in a retailer group and, in a large-scale furniture on demand manufacturer, all of them nationwide leaders in their market segments.

As for the motivation behind this paper, the authors hoped to contribute to the literature with this research explaining the relations between these two constructs, especially highlighting their roles in exploring strategic value of Big Data by the firm. Furthermore, considering that 85% of organizations fail to take competitive advantage of Big Data (Gartner, 2016), the results of this research may indicate ways that practitioners may direct investment in the development of capabilities for superior performance of this strategic scenario.

This paper follows with a discussion of the main conceptual points, as well as theoretical implications from the perspective of Resource Complementarity to this issue. The following sections discuss the methodological procedures, followed by the results research findings and its discussion.

**Literature Review**

This section sets out to discuss the conceptual elements of IMC and IT Integration Capability as well as the theoretical perspectives that underlie this research. In the end, the relations between the two constructs as well as theory are discussed.

**Theoretical Perspectives on Strategic Performance**

A superior performance strategic occurs when a value creation strategy is implemented, and that strategy is not simultaneously implemented or copied by any other current or potential competitor (Barney 1991). Among the theoretical perspectives on strategic performance, dynamic capabilities, as an extension of Resource-Based View (RBV), was shown to be the most appropriate as the central objective of this research. In order to identify the capabilities that would be able to provide strategic performance to organizations, we carried out a systematic review of the literature on IS to search for publications that discussed the theory of dynamic capabilities, based on the recommended guidelines in the Cochrane Handbook (2013).

We performed a search in the database Web of Knowledge, entering in the search field "topic" the phrases, "dynamic capabilities" and "dynamic capability." This search returned 1,381 papers. We used a set of eight journals considered by the Senior Scholars Consortium of the AIS (Association for Information Systems) as the main journals in the field of IS. This selection yielded 54 (fifty-four) papers.

Based on the analysis of these papers, four organizational capabilities could be identified (agility, flexibility, integrability and reconfigurability). So, the capabilities – integration, flexibility, reconfiguration, and agility – were fleshed out for developing the model of this research.

**Information Management Capability**

Information, when understood as a resource or capability, can be considered potentially strategic. Information management has been studied by various researchers. McGee and Pruzak (1994) indicate that an organization should consider all the resources necessary for the implementation of the strategy, including information. Focus on management of "information before turning to technology can be a highly beneficial attitude for understanding the strategic dimensions of the information" (McGee and Pruzak, 1994, p. 8). Kettinger and Marchand (2011) propose five stages of a life cycle of information in practice. At each stage, there is a continuous assessment of the information: sensing, collecting,
organizing, processing and, maintaining information. These stages, also, could be seen as the Information Management Practices which, in combination with IT Support Practices and Behavior and Values Practices, form what Marchand et al. (2000) called Information Orientation (IO).

IO Practices are the precursors of IMC. Mithas et al. (2011) conceived the term IMC to develop a conceptual model linking it with three other organizational capabilities (customer management, process management, and performance management). The results showed that these management capabilities mediate the positive influence of IMC in the performance of the firm. They developed the term from some selected items in the IS literature linking capabilities related to IT and the performance of the firm. This concept is set in three dimensions: (a) the ability to provide data and information to users with appropriate levels of accuracy, timeliness, reliability, security and confidentiality; (b) the ability to provide connectivity and universal access to adequate scope and scale; and, (c) the ability to tailor the infrastructure needs and emerging market directions.

Carmichael, Palácios-Marques and Gil Pichuan (2011) proposed that IMC, "consists of co-specialized and complements assets that indicate the organization's ability to understand and use the technological, human and organizational resources needed to manage both internal and external information." (Carmichael et al., 2011, p. 1617). From the review above, we adopted the following definition: Information Management Capability is a firm’s set of abilities to access, map, and distribute information and data from the internal and external environment so that they can be processed, allowing the organizational tailor to respond to market needs and directions.

**IT Integration Capability**

IT Integration Capability has been studied by many researchers in inter-organizational contexts. For example, the management of the supply chain (e.g. Rai and Pathayakum), or even in the context of Acquisitions and Mergers (e.g. Benitez-Amado and Ray, 2012). However, we understand that there is a necessity of high-level IT Integration Capability development as an intra-organizational integration ability for the organizations to be able to deal with Big Data and its multiple sources of data. Rai and Tang (2010) define IT integration, as a structural ability to manage external resources such as an ability of the firm met by promoting the alignment process that participates in flexibility through mutual adjustment. This integration was seen through some dimensions: accessibility, connectivity, sharing, and access.

For Butler and Murphy (2008), integration is an organizational capability that contributes to transformation features. The authors analyzed the integration as a dynamic capability in management and organizational process. However, the IS integration dynamic capability proposed by them is supported by several other generic capabilities of IS, such as the ability to manage internal and external relationships, the ability to manage the IS operations effectively, the ability to plan and manage changes and the capability in which IS is developed. Roberts and Grover (2012) found that integrating internal systems positively moderates the relationship between cross-functional coordination and the firm’s capability to answer clients. The authors differentiate thus the internal and external integration of IS.

**Development of the Prepositions**

The theoretical propositions were developed based on the theoretical perspectives to achieve strategic organizational performance and on evidence of ties among the capabilities found in the literature.

**Information Management Capability and IT Integration Capability**

For Rai and Tang (2010), IT integration capability is a structural ability for the management of external resources. In the context of this project, these resources are information flows generated by new digital technologies. The integration of resources and processes has been identified as necessary to manage this flow (Manyika, 2011; Demirkan and Delen, 2012; Pospiech; Feldens, 2012). IMC, as defined by Mithas et al. (2011) and Carmichael et al. (2011), also includes the skills of accessing and distributing these resources. Thus, IMC affects the IT integration capability.

Working on IMC, based on the study by Mithas et al. (2011), Graupner and Mädche (2012) proposed a model where IMCs play a mediating role with IT integration capability, thus impacting other organizational capabilities. In this model, they also proposed that IMCs are directly impacted by IT...
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integration capabilities. Therefore, we will not only investigate the impact of IMCs on IT integration capability but also the reverse impact, seeking to analyze the effect of complementarity.

\[ P1a - \text{Higher levels of IMCs increase the company's IT integration capability.} \]
\[ P1a - \text{Higher levels of IT integration capabilities increase IMC.} \]

**IT Integration Capability and Flexibility**

Rai and Tang (2010) found that IT integration capability has an impact on the flexibility of partnerships. Flexibility is also present in the IMC definitions through the need to adapt infrastructure so as to respond to market pressures and changes in direction (Mithas et al. 2011). Hence, the impact of the complementary effect between IT integration capability and IMCs will also be measured regarding the company’s flexibility.

\[ P2a - \text{Higher levels of IT integration capabilities increase the company's flexibility.} \]
\[ P2b - \text{Higher levels of IMCs increase the company's flexibility.} \]

**Integration Capability and Reconfiguration Capability**

Butler and Murphy (2008) analyzed integration as a dynamic capability that contributes to the transformation of resources. Accordingly, integration has a role to play in reconfiguration. If we consider the definition of Big Data by Davenport (2014) as a data set with characteristics that requires new configurations of resources and organizational processes for its exploration, then one would expect that the integration of these resources will contribute to this reconfiguration. In the third preposition, therefore, we seek to investigate the influence of IT integration capability on the reconfiguration capability of the company. The complementarity effect between IMC and integration capability will also be studied. Since the theoretical propositions are supported by the assumptions from the dynamic capabilities perspective and are defined by the firm’s capabilities to integrate and reconfigure internal and external competencies to respond to changes in the environment (Teece et al. 1997), we suggest that the impact of IMC on reconfiguration capability also be investigated.

\[ P3a - \text{Higher levels of IT integration capabilities increase the company's reconfiguration capability.} \]
\[ P3b - \text{Higher levels of IMCs increase the company's reconfiguration capability.} \]

**Flexibility and Agility**

The context of this research also requires such organizational capabilities as agility (Demirkan and Delen, 2012; Howe, 2008). Agility is “commonly used to describe firms that are able to adapt and have a good performance in rapidly changing environments” (Overby et al. 2006, p. 120). Harris and Hevner (2009) analyzed flexibility by employing the theory of dynamic capabilities and found that flexibility may be more necessary in initial conditions of uncertainty. In addition to the traditional controls, there is a need for new types of control. Tallon and Ponsoneult (2011) examined the moderating effect of IT flexibility on the agility of the company. The authors worked with the concepts of adaptability, which refers to the degree in which the infrastructure can support different IT needs, and scalability, which is the capability of IT to expand by adding or removing resources. Based on these properties, they concluded that flexibility has a positive effect on agility. In the same way and based on the proposed context, this study seeks to analyze the effects of flexibility on organizational agility.

\[ P4 - \text{Higher levels of flexibility in the firm increase organizational agility.} \]

**Reconfiguration Capability and Agility**

New technologies that result in a new competitive environment require not only that organizations reconfigure themselves but that they also respond to these changes with agility. Reconfiguration also relates to changes in the environment and to the possibility of engaging re-combinations of resources for a better product-market match (Wei and Wang, 2009). For Butler and Murphy (2008), reconfiguration refers the ability of IT professionals to adapt and use new technologies to compete as well as to adopt new routines. The model by Huang et al. (2012) analyzes the process of how information management helps companies achieve agility with customers. They support the observation that "the information
management capability is, in fact, a fundamental capability that enhances other organizational capabilities” (Mithas et al. 2011, p. 251). However, they show that to achieve agility, organizations should develop information management capabilities through a new configuration of the needed resources and skills. Just as with flexibility, one would expect to find a positive effect of the reconfiguration capability on organizational agility in this study. Based on these observations we propose preposition five:

**P5 - Higher levels of reconfiguration capabilities in the firm increase organizational agility.**

**Agility and Strategic Performance**

If the constant data flow that characterizes Big Data (Davenport et al. 2013) requires agility from organizations for the extraction of competitive value (Demirkan and Delen, 2012; Howe, 2008), then one would expect this agility, impacted by the previously identified capabilities, to be crucial to achieving a competitive advantage. Roberts and Grover (2012) see agility as an organizational capability that can achieve a competitive advantage through actions in hyper-competitive and changing environments. For IMC to be a source of sustained competitive advantage and to influence the integration, flexibility, and reconfiguration capabilities, it is necessary that these have a positive impact on the agility of responses to the changes required by the context. The effect of agility to achieve a sustained competitive advantage is thus one of the prepositions to be examined.

**P6 - Organizational agility positively influences the creation of a company’s strategic performance**

**Information Management Capability and Strategic Performance**

Even though most of the research has demonstrated IMC to have an indirect impact on firm performance (e.g Mithas et al., 2011), some studies have found a direct impact (e.g. Carmichael et al., 2011; Habjan, Andriopoulos and Gotsi, 2014). Otherwise, it is expected that IMC as an IS management capability can contribute to strategic performance improvement (Mata et al., 1995). From the perspective of IO, provided the origin of this capability, IMC not only influences firm performance but also positively impacts competitive performance.

**P7 – Information Management Capability positively influences the creation of a company’s strategic performance**

**Multiple Case Study**

This paper presents the results of a multiple case study in three market-leader organizations describes in Figure 1. To carry out this strategy, the framework proposed by Oliveira et al. (2009): Planning - data collection - data analysis - results was used. This phase of the research can be characterized according to Yin (2010), as descriptive and explanatory, as it is intended to identify the dimensions involved and their relationships, and in the next stage, aims to confirm and validate the prepositions test relations. The multiple case study (Benbasat et al., 1987; Lee et al., 1989) is required for the application of the explanatory type.
The case study protocol with 32 semi-structured questions was validated before starting the data collection by three experts, doctors with extensive experience in research on the use of this methodological approach. They proposed changes to some questions. Respondents of this case were executives of IT areas, Intelligence, business and organizational strategy. The profile of each of them can be seen in Table 1. The interviews were conducted on 2015 between July 22 and December 8 and took an average of 57 minutes each to be carried out. Besides the interviews, firm documents provided by interviewees and data published in digital media were collected. Having amended the subsequent questionnaires in few questions, the bank’s case study was incorporated as Case A after pilot case analysis. Case B is the retailer and the manufacturer is the Case C.

Data analysis was performed through the thematic analysis of content, following the steps of Bardin (2004) - choice of registry units, choice of rules and choice of the categories. To systematize the content analysis, we will use the software MaxQDA version 11.1.2.

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Position</th>
<th>Position Time</th>
<th>Organization Time</th>
<th>Education Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA1</td>
<td>IT Manager - Core Banking</td>
<td>3 years</td>
<td>8 years</td>
<td>Computer Science</td>
</tr>
<tr>
<td>CA2</td>
<td>Modeling and BI Manager</td>
<td>9 years</td>
<td>9 years</td>
<td>Business, Accounting</td>
</tr>
<tr>
<td>CA3</td>
<td>Business Intelligence</td>
<td>5 years</td>
<td>7 years</td>
<td>IT, Business</td>
</tr>
<tr>
<td>CA4</td>
<td>Business Unit Manager</td>
<td>3.5 years</td>
<td>8 years</td>
<td>Business</td>
</tr>
<tr>
<td>CA5</td>
<td>Insurance Director</td>
<td>6 years</td>
<td>11 years</td>
<td>Law, Business</td>
</tr>
<tr>
<td>CB1</td>
<td>E-commerce Head</td>
<td>2 years</td>
<td>5 years</td>
<td>Business</td>
</tr>
<tr>
<td>CB2</td>
<td>IT Coordinator of Information Architecture</td>
<td>4 years</td>
<td>9 years</td>
<td>IT</td>
</tr>
<tr>
<td>CB3</td>
<td>E-commerce Coordinator</td>
<td>1 year</td>
<td>2 years</td>
<td>Business</td>
</tr>
<tr>
<td>CB4</td>
<td>E-commerce Analyst</td>
<td>1 year</td>
<td>3 years</td>
<td>Business</td>
</tr>
<tr>
<td>CB5</td>
<td>Marketing Manager</td>
<td>2 years</td>
<td>4 years</td>
<td>Communication</td>
</tr>
<tr>
<td>CC1</td>
<td>IT Manager</td>
<td>17 years</td>
<td>17 years</td>
<td>IT, Business</td>
</tr>
<tr>
<td>CC2</td>
<td>Information Management Analyst</td>
<td>2 years</td>
<td>30 years</td>
<td>Business</td>
</tr>
<tr>
<td>CC3</td>
<td>IT Operations Coordinator</td>
<td>4 years</td>
<td>15 years</td>
<td>IT, Business</td>
</tr>
<tr>
<td>CC4</td>
<td>Integrated Systems Coordinator</td>
<td>5 years</td>
<td>13 years</td>
<td>Business</td>
</tr>
<tr>
<td>CC5</td>
<td>Commercial Analyst</td>
<td>2 years</td>
<td>22 years</td>
<td>Business</td>
</tr>
</tbody>
</table>

Table 1. Interviewee Profiles

**Analysis**

The analysis results first sought to interpret the connection among the constructs, IMC, and IT Integration Capability and among their dimensions. To accomplish this first analysis, from the categorization of dimensions previously identified in the literature, a connection matrix between the two categories and their dimensions was extracted from the supporting software. This procedure was adopted to analyze all the relations developed in the theoretical propositions already presented.
In analyzing propositions P1a and P1b in the first case, later confirmed in the others, the need to divide the integration capability analysis into two capabilities – internal and external – was perceived. From this observation, all propositions involving Integration Capability were duplicated into Internal (IIC) and External (EIC).

Although IIC demonstrated an influence over IMC various times, and sometimes to the contrary, it was clear that Information Infrastructure impacts the four intermediate IIC categories in the three cases. We can conclude that there is a standard of Information Infrastructure activity that facilitates and precedes IS Internal Integration Capability within all the intermediate IMC categories. Likewise, the Information Distribution category, when impacted, was facilitated by the four IIC intermediate categories. Therefore, Information Distribution generally occurs as a function of Internal Integration abilities as a whole. The other intermediate categories were proven to occur in both directions of the complementarity relation.

It was not possible to observe a unanimous standard relation between IMC and EIC. All acted jointly with the other capability’s intermediate categories, at times beforehand, other times as a consequence. In the cases and relations in which they were identified, Information Access and Information Distribution were impacted by External Integration. Infrastructure, in an example that occurred in Internal Integration, impacted three of the four External Integration intermediate categories. No relation was observed on the other. Thus, again, Information Infrastructure demonstrated to be a strong antecedent of the firm’s External Integration Capability.

In the IS Capabilities and Flexibility relations, few standards were observed in the three cases. IMC’s influence on Flexibility was only unanimous through Information Distribution’s relation on Efficiency. While in the relation with IIC, no category was shown to relate to Flexibility, which impedes a homogeneous standard to exist in the three cases. The occurrences identified as positive in the two cases were the influence of Access and Integrated Operations on Efficiency. The only relation that presented an occurrence in two cases of the relation between EIC and Flexibility was Integrated Operations on Efficiency.

The influence on the Reconfiguration Capability (RC) presented some standards in analyzing the three cases. The impact of IMC on RC was unanimous in relation to Information Infrastructure on Adaptation to new suppliers. No standard was verified in the IIC relation with the Reconfiguration Capability. Two EIC elements – Access and Integrated Operations – were perceived in two cases to affect Adaptation to new suppliers. The exception was in Case A, where no External Integration category was identified to relate to the Reconfiguration Capability.

Agility was expected to be influenced as much by Flexibility as by the Reconfiguration Capability. In the case of Flexibility’s impact, four relations among the four intermediate categories were unanimous: the influence of Efficiency and Responsiveness on Response to Changes, the influence of Responsiveness to Anticipation to Changes, and of Versatility on Anticipation to changes to the environment. In the three cases, there were no relations in the relation between the Reconfiguration Capability and Agility.

The standards examined in IMC’s direct relation with strategic performance point to two relations with greater occurrence: Information Architecture, conferring Value to the firm, and Infrastructure, conferring Immobility to strategic resources. Therefore, it is not possible to affirm that there is a standard among the cases that evidence the possibility of a direct relation between IMC and strategic performance, not even on a temporary competitive advantage because one of the requirements was not attained in the total number of cases. On the other hand, it is necessary to consider that, regarding competitiveness, perception of advantages can occur as a function of various resources, not only of IMC. In this case, the indirect impact, more intimately related to Agility, was observed unanimously only in the relations of Perception and Response to Changes on Immobility. Therefore, even if it is not possible to affirm a standard occurrence that leads us to deduce that Agility can confer strategic performance, the main elements indicate that this capability acts as a factor of Immobility, which is the requirement that confers sustainability to a competitive advantage. In this way, Agility, if combined with other capabilities that confer Value and Heterogeneity, can be an important element for strategic performance.

Discussion and Conclusions

The impact of resources and IS capabilities on the firm’s performance, in general, tends to occur indirectly (Wade and Hulland, 2004; Taher, 2012). It is not the resources themselves, but the way theses resources
and abilities are managed that confer a competitive advantage to the firms (Mata et al., 1995). In the same way, the effects of Information Management Capabilities on firm performance were empirically supported to be indirect (Mithas et al., 2011). Integrated information delivery has a positive effect on successful effective information use (Kettinger et al. 2013). Because of the need to develop a model that traces a way in which IMC and Integration can influence a firm’s strategic performance, we sought to find the categories that can measure this influence in the literature.

The relations among the categories were thoroughly analyzed so as to comprehend how they occur by evaluating the intersections among each capability’s elements and dimensions. One of the preliminary analysis’ results in the pilot case was due to the need to dismember IS Integration Capability into Internal and External. The final case analysis considered this division, as well as the qualitative research. Some standards in the relations proposed in the research model were identified in the cases: complementarity between IMC and internal and external integration capability, IMC relation with Flexibility with the Reconfiguration Capability, Flexibility’s relation with Agility, and Agility with Strategic Performance. The only expected relation in the model that was not observed in any of the cases was the interaction between IIC and the Reconfiguration Capability. Other relations were perceived only in some cases.

Figure 2 illustrates the relations observed among the capabilities in each of the three cases. The differences perceived among the cases help to explain the occurrences observed in the proposed model. The lines’ thickness indicates the intensity with which the relations were observed in each case’s various interviews. In the case of complementarity between IMC and integration capabilities, the dotted line indicates the direction observed with less intensity in comparison with the inverse direction.

In the case of complementarity between IMC and EIC, for example, the most frequent relation was detected from the second to the first in Case C, unlike what happened in the others. In the same way, EIC relations with the Reconfiguration Capability and Flexibility were observed in Case C, which did not occur in the rest. Case C presented the greatest level of external integration development. Thus, it can be understood that the other two organizations’ difficulty in EIC use made it impossible to observe the positive effect of this capability on consequent abilities, which ends up reinforcing the proposed relations.
Finally, in the case analysis, the potential of IMC as a resource capable of providing competitive advantage was also evaluated. In other words, we did not examine the direct impact on competitiveness, but the potential to generate that competitive differentiation. This evaluation was realized considering the three requirements of differentiation and sustainability (Barney, 1991; Mata et al., 1995). In this analysis, Case C behaved like the rest but presented greater intensity than the other cases. This can be explained by this case presenting a greater level of the three capabilities related to IS.

As a research contribution, this paper draws attention to the information management role as one of the abilities which provides competitiveness to the firms. Accordingly, as one of the conclusions of this research, at least two ways in which IMC and Integration can influence the firms’ strategic performance were perceived. The most significant way goes from IMC to IIC and positively impacts Flexibility, with Agility as the intermediary for competitive performance. This study’s limitation is the nature of the limited organizations. Even though care was taken in choosing companies that are market leaders from distinct sectors (since the objective was to observe strategic performance), it is understood that the results cannot be generalized for other industries. Future research can analyze these relations from a qualitative methodological perspective.

REFERENCES


