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ORIGINAL ARTICLE

Organizational structure as antecedent of dynamic capability

A estrutura organizacional como antecedente da capacidade dinâmica

Rodrigo Valio Dominguez Gonzalez[1]

[1] Universidade Estadual de Campinas – UNICAMP, Faculdade de Ciências Aplicadas – FCA, Limeira, SP, Brasil. E-mail: rodrigo.gonzalez@fca.unicamp.br

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Abstract: Dynamic capability is recognized in the academic and business context as an essential factor for the firm to build differential and remain competitive in dynamic markets. Most of these preliminary studies assess dynamic capability from the perspective of the resource-based view of the firm. This study advances on this theme by analyzing the impact of knowledge-based dynamic capability, based on the knowledge based vision of firm, about innovation of project team. Previous studies have identified the relationship between dynamic capability and innovation or organizational performance, but there is a gap in the theory that relates antecedents of dynamic capability. Thus, this research aims to analyze the relationship between organizational structure and dynamic capability on the innovative capacity of project teams. To achieve this objective, 65 project teams from industrial companies in the state of São Paulo were studied and the data were analyzed using the technique of structural equation modeling - partial least squares (SEM_PLS). The results show that structures with a higher degree of formalization and centralization have a negative impact on knowledge-based dynamic capability, and integration has a positive relationship with dynamic capability. Furthermore, the research shows that the innovative capacity of project teams is directly affected by the ability to generate and combine knowledge, however, the acquisition / absorption of knowledge does not interfere with the innovation activity of these teams.

Keywords: Knowledge-based dynamic capability; Organizational structure; Innovation; Project team; Industry.

Resumo: A capacidade dinâmica é reconhecida no âmbito acadêmico e empresarial como um fator essencial para a firma construir diferencial e manter-se competitiva. Estudos preliminares avaliam a capacidade dinâmica sob a óptica da visão da firma baseada em recursos. Este estudo avança neste tema ao analisar o impacto da capacidade dinâmica baseada em conhecimento, apoiando-se na visão baseada em conhecimento, em relação à capacidade de inovação de times de projeto. Estudos prévios identificam a relação entre a capacidade dinâmica e a inovação ou performance organizacional, mas existe uma lacuna na teoria que relacione antecedentes da capacidade dinâmica. Desta forma, esta pesquisa tem por objetivo analisar a relação entre estrutura organizacional e capacidade dinâmica sobre a capacidade inovativa de times de projeto. Para alcançar este objetivo foram estudados 65 times de projeto de empresas industriais e os dados foram analisados a partir da técnica SEM-PLS. Os resultados apontam que estruturas maior grau de formalização e centralização impactam negativamente à capacidade dinâmica baseada em conhecimento, e a integração apresenta relação positiva. E ainda, a pesquisa mostra que a capacidade inovativa de times de projeto é diretamente afetada pela capacidade

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de geração e combinação de conhecimento, entretanto, a aquisição/absorção de conhecimento não interfere na inovação.

Palavras-chave: Capacidade dinâmica baseada em conhecimento; Estrutura Organizacional; Inovação; Times de projeto; Setor industrial.

1 Introduction

The firm's need to innovate, generating competitive advantage and differentiation is a consolidated fact in the academic and business spheres (Grant, 1996; Gupta, 2021; Lin et al., 2020; Mahmud et al., 2020). To achieve innovation, organizations are increasingly adopting a teamwork-based work organization model (Gonzalez & Melo, 2021; Liu et al., 2019). Collaboration between individuals and the multidisciplinary characteristic to carry out knowledge-intensive tasks support the achievement of innovation goals in teamworks (Liu et al., 2019; Mell et al., 2013).

Many studies highlight the development of a firm's dynamic capability as an essential factor to achieve sustained innovation (Teece et al., 1997, 2016; Ali et al., 2020; Zotoo et al., 2021). The theory of dynamic capability originates from the resource-based view of the firm (RBV), and is defined by Teece et al. (1997) as the firm's ability to integrate, build and reconfigure internal and external competencies in order to respond quickly to external changes. Subsequently, from the knowledge-based view (KBV), Zahra & George (2002) proposed the dynamic capability based on knowledge. The main evolution of the concept lies in the value given to knowledge and, based on this new approach, dynamic capability is defined as the organizational competence to create, make available and protect intangible assets that sustain superior performance (Teece et al., 2016). This new proposal highlights the role of knowledge as a structural element of dynamic capability.

Several researchers emphasize that project teams present an organizational context that is conducive to building dynamic capability (Hermano & Martín-Cruz, 2016; Szymanski et al., 2007; Mahmud et al., 2020). While dynamic capability has become an important and emerging theme in the literature (Zollo & Winter, 2002; Teece et al., 1997), only today has this theme been explored in greater depth, looking for relationships with other antecedent variables, evaluating the factors that promote it, such as the organizational structure (Calabuig et al., 2018; Brandon-Jones & Knoppen, 2018).

Previous research emphasizes that organizational structure characteristics can affect employees' motivation and commitment to the organization, and also impact their ability to rebuild or develop new skills capable of adapting the firm to new strategies (Teece et al., 2016) . While researchers highlight the central role of organizational structure as a determinant of innovation (Ali et al., 2020; Walheiser et al., 2021), and others relate dynamic capability as a preponderant factor to innovation (Wang et al., 2015; Teece et al., 2016), there is a lack of studies that assess how the organizational structure impacts the dynamic capability and innovative performance of project teams.

A study by Gonzalez & Melo (2019) points out that dynamic capability is typically represented in the literature as an independent variable, through which competitive advantage, financial performance or business performance is sustained. Differently, researchers have ignored the antecedents of dynamic capability, that is, positioning dynamic capability as a variable dependent on aspects of the firm, such as the case of organizational structure.

According to Jansen et al. (2005), it is important that we investigate dynamic capabilty as a dependent and mediating construct, as the multidimensionality that permeates this construct

requires that studies that relate it take into account organizational antecedents. Ali et al. (2020) argue that organizational characteristics can have different effects on dynamic capability and, consequently, can lead to different results regarding the organization's performance, such as innovation. In this study, we consider the characteristics of the organizational structure – formalization, centralization and integration (Chen et al., 2010; Zheng et al., 2010; Walheiser et al., 2021; Zotoo et al., 2021; Gonzalez & Melo, 2019) – delineate the flow of knowledge between individuals, teams and departments, and also between hierarchical levels of the organization, and, therefore, impacting the development of dynamic capability.

Researches about dynamic capability suggest that project teams perform outstandingly when their members recognize which peers master a particular knowledge (Kanawattanachai & Yoo, 2007; Ali et al., 2019). However, the distributed nature of knowledge among team members limits its intensive use (Choi et al., 2010). Teams that do not effectively integrate individual knowledge often fail to generate potential benefits (Mell et al., 2013). In this sense, studies that assess the development of dynamic capability based on knowledge of teams must take into account the role of the organizational structure as an element capable of integrating individuals and their knowledge in order to develop innovative activities.

In this way, we contribute to the literature in two main ways. First, we advance the literature on innovation in project teams by contextualizing the relationship between knowledge-based dynamic capability and innovative capability. In this work, the innovative capacity consists in the ability of individuals, inserted in project teams, to mobilize knowledge and ideas that stimulate the development of new products, processes and systems (Wang et al., 2015). Innovative capacity is related to the development of skills and behaviors in project teams that support the identification, creation and combination of knowledge that promote learning and innovation (Gupta, 2021). While previous research is largely focused on evaluating the relationship between innovation and product development performance (Walheiser et al., 2021; Szymanski et al., 2007) and business performance (Ali et al., 2020; Griffin & Hauser, 1996), we theoretically develop and empirically validate how two antecedents relate to innovative capacity: knowledge-based dynamic capability and organizational structure. This study proposes the existence of a direct relationship between the dynamic capability based on knowledge and the innovative capacity of teams. Second, while several previous researches relate the characteristics of organizational structure and innovative performance (Walheiser et al., 2021), and dynamic capability and innovative performance (Ali et al., 2020; Zotoo et al., 2021), this research theoretically advances in the literature by investigating the relationship between factors that precede innovation, analyzing how the ability to acquire, generate and combine knowledge is influenced by the structural characteristics of the organization, related to its model of formalization, centralization of power and integration of knowledge, people and Law Suit. Furthermore, this study analyzes the mediating effect of dynamic capability on the relationship between organizational structure and innovative performance of project teams.

2 Theoretical framework and research hypotheses

2.1 Influence of organizational structure on knowledge-based dynamic capability

The organizational structure refers to the patterns and configurations of relationships and links between individuals and departments, playing a facilitating role in terms of access to potentially applicable knowledge, ideas or resources, increasing the potential for knowledge

creation and exchange (Chen et al., 2010). Organizational structure acts as a moderator in the relationship between organizational knowledge and innovation (Acharya & Mishra, 2017; Chen et al., 2010). Authors such as Zheng et al. (2010), Chen et al. (2010), Walheiser et al. (2021), Zotoo et al. (2021) and Gonzalez & Melo (2019) treat the organizational structure from three elements: formalization, centralization and integration.

Formalization refers to the degree to which activities within the organization are standardized, as well as the degree to which individuals' behavior is driven by rules and procedures (Chen et al., 2010). In organizations with a high degree of formalization, there are explicit rules and procedures that impede spontaneity and flexibility on the part of team members, negatively impacting the firm's dynamic capability. When activities are more standardized, there is less need for team members to discuss the content of the work and alternatives for rebuilding competencies. On the other hand, in organizations with teams that work with less standardized routines, the conduct of activities and the behavior of team members are relatively unstructured, stimulating the process of creation and innovation (Gonzalez & Melo, 2019).

Many studies analyze the relationship between formalization and the two-stage model of organizational initiation and implementation (Damanpour & Gopalakrishnan, 1998; Kim, 1980). These studies assess the process of organizational change and adaptation to internal and external factors in light of the relationship between formalization and learning. Shepard (1967) indicates that low formalization is more appropriate for the initiation process, whereas high formalization is more appropriate for the implementation process. According to the author, during the initiation phase, the organization needs to be more flexible and open to new information and alternatives for action. In contrast, during the implementation phase, the organization needs to build a single purpose from the choices made in the previous phase. In this context, formalization will be negatively related to initiation, but will have a positive impact on the implementation and adoption of procedures and techniques (Damanpour & Gopalakrishnan, 1998; Kim, 1980).

Other studies, in turn, such as this research, assess the relationship between formalization and the firm’s dynamic capability. Authors such as Walheiser et al. (2021), Acharya & Mishra (2017) and Jansen et al. (2005) argue that formalization limits the scope of knowledge acquisition, reducing the individual's ability to assimilate external knowledge. According to Jansen et al. (2005), the excess of previously prescribed rules and procedures can hinder the establishment of informal relationships between individuals, as well as with external partners, reducing the capacity to generate new knowledge internally. Otherwise, formalization creates an organizational memory, which is essential for the transformative learning process, which is based on the combination of retained knowledge (Ali et al., 2019). This involves collecting solutions and knowledge previously applied in solving previous problems, applying them to current needs and problems, in a process of transformation of primary knowledge (Ali et al., 2019). In this context, the first group of hypotheses is stated:

H1a. Formalization negatively impacts the ability to acquire knowledge.

H1b. Formalization negatively impacts knowledge generation capacity.

H1c. Formalization positively impacts the ability to combine knowledge.

Centralization concerns the degree to which decision-making power is concentrated at the highest levels of the organization (Zheng et al., 2010). A less centralized structure is defined by several authors as a driver of the dynamic capability and knowledge management process (Walheiser et al., 2021). While a minority of studies

point to a positive impact of centralization on organizational performance (Ruekert et al., 1985), most research demonstrates that less centralized structures favor organizational efficiency and effectiveness, in particular, innovative performance (Walheiser et al., 2021; Burns & Stalker, 1961; Zheng et al., 2010). The work by Zheng et al. (2010) highlights that less centralized structures encourage communication and increase satisfaction and motivation, because in these structures, a horizontal and vertical communication flow is encouraged. Furthermore, motivation is increased by the decentralization of decision making, allowing individuals with a certain level of knowledge to have authority and responsibility over their processes (Mihalache et al., 2014; Damanpour, 1991). In more centralized structures, the decision-making process implies a greater number of channels through which the communication of new ideas and learning must pass.

Analyzing the current researches that relate centralization with dynamic capability, regarding the acquisition or absorption of knowledge, there is no consensus on this relationship. Studies such as Monteiro et al. (2020), Liao et al. (2011) and Burcharth et al. (2015) point to a positive relationship between centralization and dynamic capability. In contrast, Damanpour (1991), Liao et al. (2011), Jansen et al. (2006) and Zheng et al. (2010) show a negative relationship. The main point in favor of centralization is specialization in functional or technical areas that provide services to other areas or departments (Monteiro et al., 2020), increasing the efficiency of processed information and sustaining the capacity to absorb new knowledge by building a base solid knowledge base (Liao et al., 2011). In more centralized structures, decisions are taken by the superior hierarchical portion that indicates and guides the set of knowledge and competences required from the functional areas (Damanpour, 1991).

In a different way, authors such as Jansen et al. (2006) argue that centralization reduces the firm's dynamic capability, as knowledge-centered activities, such as the innovative process in project teams, require a process of solving non-routine problems, proposing the transformation of existing primary knowledge. For Gonzalez & Melo (2019, 2021), centralized structures present a more stable knowledge behavior, that is, the primary knowledge base is conserved in order to solve specific problems. On the other hand, the authors consider that more centralized structures can harm the knowledge generation and combination processes by restricting decision-making and the experimental process. Thus, we state the second set of hypotheses:

H2a. Centralization negatively impacts the ability to acquire knowledge.

H2b. Centralization negatively impacts knowledge generation capacity.

H2c. Centralization negatively impacts the ability to combine knowledge.

Integration describes the degree to which activities of different actors in the organization can be coordinated through formal mechanisms in order to achieve common goals and objectives (Liao et al., 2011; Kim, 1980). Ali et al. (2019) suggest that in times of increased competitiveness and dynamic environments, the organization's performance depends on high levels of differentiation and integration of activities. Diversity of occupations, specialization in individual tasks and horizontal departmentalization are essential for dynamic organizational capability (Gonzalez & Melo, 2021).

Organizational integration is essential for exploration processes via absorption of new knowledge and knowledge exploitation through the generation and combination of retained knowledge, as integrated environments allow individuals or groups to collect all solutions previously applied to specific problems and use this knowledge into new applications, transforming it (Burcharth et al., 2015). Dynamic capability requires people

who are skilled in specialized tasks, as well as people who build the links between those specialized employees or departments. Typically, this integration effort is carried out by area managers (Liao et al., 2011). Thus, the third set of hypotheses is stated:

H3a. Integration positively impacts the ability to acquire knowledge.

H3b. Integration positively impacts knowledge generation capacity.

H3b. Integration positively impacts the ability to combine knowledge.

2.2 Influence of knowledge-based dynamic capability on the innovative capacity of teams

The dynamic capability theory explains the difference in companies' returns under conditions of uncertainty and environmental change, that is, the key question studied in dynamic capability is why certain organizations are able to quickly adapt and respond to environmental changes and achieve competitive advantage, when compared to another group of companies (Teece et al., 1997). More specifically, the dynamic capability theory explains that to obtain strategic advantage, it is not enough for a firm to own certain resources or capabilities, on the contrary, the firm must be able to reallocate and reconfigure these resources in order to respond rapidly to environmental changes (Teece et al., 1997; Teece et al., 2016).

Zollo & Winter (2002) define dynamic capability as “a pattern of collective activity through which the organization generates and modifies its operating routines in pursuit of improved effectiveness” (2002, p. 340). Thus, dynamic capabilities are developed and incorporated into organizational routines, rather than simply being purchased from the market (Brandon-Jones & Knoppen, 2018). Winter (2003) points out that the firm's functional activities, that is, those that allow its existence within a market, constitute its operational capabilities. Dynamic capabilities, in turn, are those that enable the organization to understand its environment, the value of resources and respond appropriately to market changes in order to improve operational capabilities. That's why Winter calls dynamic capabilities first-level capability.

KBV is based on the assumption that the advantages arising from organizational resources and skills are, in fact, a reflection of the access and integration of a superior resource, that is, knowledge (Grant, 1996; Denford, 2013). In this context, the firm can be seen as knowledge repositories, which allows the generation of differentiation and innovation (Grant, 1996).

Zheng et al. (2011) describe dynamic capability as the firm's ability to acquire, generate and combine knowledge in order to identify, explore and adapt it in situations of environmental change. The ability to adapt and renew skills highlights a firm among its competitors in terms of its innovative potential and knowledge plays a central role in this transformation process (Denford, 2013). Knowledge, in this context, can be defined as explicit and tacit, information and knowledge, or, as to its content, as managerial, technical or marketing (Zotoo et al., 2021).

Zheng et al. (2011) propose three knowledge capabilities: knowledge acquisition capability (KAC), knowledge generation capability (KGC), and knowledge combining capability (KCC), which are used in this research as constructs related to dynamic capability based on knowledge. The integration of these three dimensions proposed by Zheng et al. (2011) promotes a knowledge-based dynamism that influences the degree of innovation of individuals or even the firm. These three dimensions of knowledge-based dynamic capability tend to develop simultaneously, building themselves

interdependently (Denford, 2013). According to Zheng et al. (2011), the stock of primary knowledge retained by the organization and individuals is a prerequisite for the development of the three dimensions, especially for the acquisition and generation of knowledge, in a process of absorption of external knowledge and internal creation, respectively. The combination, in turn, depends on the capacity of individuals and groups in the firm to retrieve and relate the knowledge absorbed and created.

The first dimension proposed by Zheng et al. (2011), the acquisition of knowledge, takes into account the firm's knowledge and frontier, classifying knowledge as internally developed or absorbed from the external environment (Cohen & Levinthal, 1990). The knowledge acquisition process proposed by Zheng et al. (2011) concerns the dynamics of absorption of external knowledge, that is, the firm's ability to identify and acquire external knowledge, inserting it within the organizational context. This study argues that the absorptive capacity of project teams helps to strengthen innovation (Wang et al., 2015). The absorption capacity, in this sense, is one of the determining factors for a project team to acquire new external knowledge and apply it in solutions that generate innovation. Since knowledge acquisition capacity increases the speed and frequency of innovation, this capacity allows the company to produce databases of knowledge and competitive advantages in order to explore new product innovation (Mahmud et al., 2020). Thus, this study argues the following hypothesis:

H4a. KAC positively impacts the innovative capacity of project teams

The second dimension of knowledge-based dynamic capability, knowledge generation, concerns the firm's ability to develop and refine activities that promote the generation of new knowledge (Zheng et al., 2011). Generation is preliminarily understood as an internal process, such as Research & Development or SECI process proposed by Nonaka & Takeuchi (1995) that allows the creation of new knowledge (Denford, 2013). The importance of external (acquired/absorbed) and internal (generated/created) knowledge and their interaction emerge in the literature as drivers of the innovation process in project teams (Martínez-Román et al., 2020). While the knowledge acquired externally allows the exploitation of the team's internal capacity, efforts to generate new knowledge facilitate the assimilation and exploitation of technologies available in the market (Martínez-Román et al., 2020; Mahmud et al., 2020). The generation of knowledge is closely related to the learning capacity of project teams, which promotes technological control and autonomy, developing internal innovative capabilities (Martínez-Román et al., 2020). Thus, we have the second hypothesis regarding the relationship between dynamic capability based on knowledge (generation) and innovation:

H4b. KGC positively impacts the innovative capacity of project teams

The ability to combine knowledge is the third dimension of knowledge-based dynamic capability considered in this study. The ability to combine is derived from the last two capabilities (acquisition and generation), since it brings together the firm's ability to integrate and apply knowledge of external (absorbed) and internal (created) origin, which can generate the development of a new knowledge (Zheng et al., 2011; Wang et al., 2015). The combining ability encourages the use of retained internal knowledge that allows for the development of new knowledge, while also optimizing existing knowledge (Mahmud et al., 2020). Studies such as Mahmud et al. (2020) and Zheng et al. (2011), Gonzalez & Melo (2021) propose that the presence of commitment and collaboration between the members and functions involved are essential for the knowledge integration process. In the context of the project activity in teams, these conditions help teams to explore internal knowledge, favoring the creation of new technologies in response to environmental changes. In addition, combining or integrative capability also allows project teams to exploit their current products and markets (Nath & Ramanathan, 2016). Typically, combination activities aimed at exploiting knowledge involve

the multidisciplinary characteristic of project teams (Wang et al., 2015), that is, individuals with mastery of different sets of skills and knowledge come together, reconfiguring existing knowledge, generating exploratory innovation (Wang et al., 2015; Nath & Ramanathan, 2016). Thus, we have the third hypothesis concerning the relationship between knowledge-based dynamic capability (combination) and innovation:

H4c. KCC positively impacts the innovative capacity of project teams

Figure 1 illustrates the theoretical model and research hypotheses.

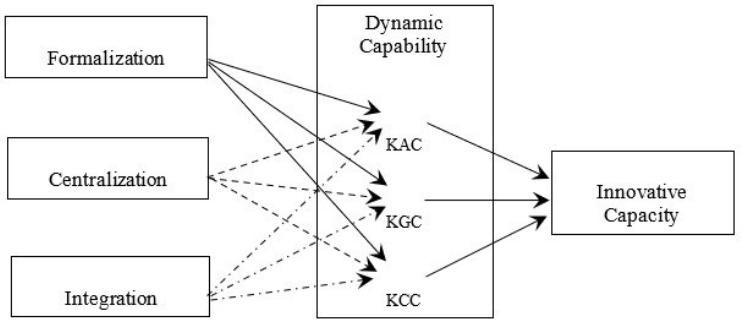

Figure 1. Theoretical research model and hypotheses.

3 Research method

3.1 Sample and data collection

The questionnaire developed for this study was preliminarily subjected to a pilot test based on interviews involving 16 participants, including researchers and project professionals. From the pilot test, the research items had their wording improved in order to promote a better understanding of the research participants, and still, two items of the dynamic capability construct were unified for dealing with similar aspects (Appendix A).

The target population of this study is formed by CEOs, managers and project coordinators from firms from all industries located in Brazil. The primary sample of this study consists of 7,012 industrial companies registered in the catalog of the Industrial Registry of the State of São Paulo of the Center of Industries of the State of São Paulo (CIESP, 2021). The research group randomly selected a group of 1,200 companies to participate in the research. The procedure for data collection consisted of sending an email to the CEO, managers and coordinators of the project or engineering areas in order to explain the objective of the survey and formalize the invitation to participate in the period from August 2020 to December 2020. This invitation highlighted the need for the company to have a project activity with teams formed by at least three members, excluding the project manager or coordinator, for at least three months, and included a link to the online questionnaire. By clicking on the link, the respondent could access the questionnaire, complete it online and then send it automatically, saving it in the survey database. The survey reached a total of 274 answered questionnaires, originating from 69 companies. Twelve questionnaires were discarded, as the respondent indicated that his company did not develop a project activity (8 questionnaires) or because he did not have project teams with at least three members (4 questionnaires). The online questionnaire did not allow submission of incompletely answered questionnaires. Thus, the

survey reached a total of 262 valid questionnaires, originating from 65 different companies in the Brazilian industrial sector, generating a response rate of 5.42%. Although the final response rate is relatively low, which may limit the study's potential for generalizability, this rate is in line with other research in the area (Gonzalez & Melo, 2021; Brandon-Jones & Knoppen, 2018; Mahmud et al., 2020; Ali et al., 2020). Table 1 summarizes the demographics of the surveyed companies and respondents.

Table 1. Demographic characteristics of companies, teams, and respondents.

Measurements	Items	Frequency	Percentage
Empresas pesquisadas			
Industry	Machinery and Equipment	60	22.90
	Automotive	57	21.76
	Metallurgy and Steel industry	44	16.79
	Chemistry	39	14.12
	Food	26	9.92
	Computers and home appliances	20	7.63
	Pharmaceutical and Cosmetic	13	4.96
	Paper And Cellulose	3	1.15
	Textile	2	0.76
Number of employees	50 or less	78	29.77
	51-100	87	33.21
	101-500	48	18.32
	501-1000	26	9.92
	Above 1000	23	8.78
Teams			
Team size	3-5	51	19.47
	6-10	88	33.59
	11-20	80	30.53
	Above 20	43	16.41
Team tenure	3-6 months	118	45.04
	7 months-1 year	72	27.48
	1y-2y	42	16.03
	Above 2 years	30	11.45
	Respondents		
Gender	Male	158	60.31
	Female	104	39.69
Educational level	Undergraduate	37	14.12
	Graduate	160	61.07
	Master or above	65	24.81
Position	Coordination/Supervision	86	32.82
	Manager	142	54.20
	Senior Manager/CEO	34	12.98
Age range	18-25	64	24.43
	26-35	87	33.21
	36-45	75	28.63
	Above 45	36	13.74

3.2 Aggregation

Individual responses were grouped into their corresponding teams in order to handle data at the team level. The rwg index was calculated to assess whether the responses of the team members are homogeneous, validating the aggregation

(Biemann et al., 2012). The ICC(1) and ICC(2) class correction coefficients are also calculated. Regression analysis showed that rwg >0.80, ICC(1) > 0.20 and ICC(2) > 0.70 are above the acceptable level (Biemann et al., 2012) for all studied constructs.

3.3 Measures

The questionnaire was developed from validated measurement items present in the literature. A seven-point Likert scale, 1 (strongly disagree) and 7 (strongly agree) was used to measure the questionnaire items. The measure items of the study's constructs are detailed below.

Organizational structure is measured from three constructs. The first, formalization, is measured through three items; centralization is assessed through three items; and the third construct, integration, is measured through two items. The items of the three constructs referring to organizational structure were extracted from the work of Andrews & Kacmar (2001) and Germain (1996).

Knowledge-based dynamic capability is measured from three constructs: KAC, KGC and KCC, with the first two constructs having five measurement items, and the last one having six measurement items. The measure items of the three constructs were extracted from the work of Zheng et al. (2011).

The innovative capability of the project teams was assessed using eight measurement items from the scale developed by Burpitt & Bigoness (1997).

And finally, we control the effects of these variables, including control variables. Based on previous innovation studies, we controlled for the potential effects of team size (TAT), team age (TET) and task interdependence (IT) on innovative performance (Ali et al., 2020; Walheiser et al., 2021). Team size is measured by the number of individuals who systematically work on the team; team age is measured by the number of months the individual has worked on the team. The interdependence of tasks is measured by six measurement items originating from the work by Ali et al. (2020). Survey items are included in the attachment to this study.

3.4 Analysis method

This study uses the technique of Partial Least Square – Structural Equation Modeling (PLS-SEM) for data analysis, using the Smart-PLS software (version 3.0). PLS-SEM is a technique widely used in management studies, including several studies on dynamic capability, teamwork, organizational structure, and innovative performance (Gonzalez & Melo, 2019, 2021; Ali et al., 2020; Chión et al., 2019). Hair et al. (2013) highlight the PLS-SEM as it is a technique with fewer restrictions regarding data normality, and it is also applied in smaller samples when compared to structural equation modeling (SEM). In addition, PLS is also recommended for models with complex relationships (Fornell & Larcker, 1981) and for studies dealing with theoretical development based on constructs (Hair et al., 2013), as is the case in this study that aims to analyze the relationship between three constructs (organizational structure, dynamic capability and innovative performance of project teams).

3.4.1 Estimation of the measurement model

First, to assess the reliability and validity of the research model, the confirmatory factor analysis (CFA) technique was conducted. The reliability measures of the constructs, according to Hair et al. (2013), used in this study are Composite Relibility (CR), Cronbach's α, and Dijkstra-Henseler Rho_A. The minimum value for these three measurements is 0.70 (Hair et al., 2013). Table 2 shows that all constructs have an adequate level of reliability.

Table 2. Reliability, multicollinearity, and convergent validity.

Variable	Items	Loading	α	CR	AVE	ρA	VIF[a]
B							
Formalization	Form1	0.842					1.60
	Form2	0.881	0.815	0.798	0.776	0.811	1.74
	Form3	0.793					2.31
Centralization	Cent1	0.765					2.26
	Cent2	0.810	0.795	0.776	0.712	0.785	2.43
	Cent3	0.798					2.12
Integration	Int1	0.741	0.766	0.784	0.743	0.768	1.92
	Int2	0.720					1.71
Dynamic Capability							
KAC	KAC1	0.812					1.55
	KAC2	0.886	0.780	0.816	0.680	0.736	2.65
	KAC3	0.838					2.05
	KAC4	0.873					1.77
	KAC5	0.855					2.08
KGC	KGC1	0.803					1.90
	KGC2	0.818	0.796	0.804	0.673	0.828	2.47
	KGC3	0.773					2.76
	KGC4	0.792					2.53
	KGC5	0.836					1.89
KCC	KCC1	0.773					1.74
	KCC2	0.781	0.792	0.788	0.715	0.861	1.68
	KCC3	0.765					2.43
	KCC4	0.773					2.06
	KCC5	0.778					1.79
	KCC6	0.845					1.90
Teams Innovative Capability	CIT1	0.780					1.95
	CIT2	0.766					1.73
	CIT3	0.787	0.778	0.765	0.812	0.864	1.44
	CIT4	0.790					2.06
	CIT5	0.808					1.63
	CIT6	0.827					2.23
	CIT7	0.818					2.45
	CIT8	0.806					2.81
Task Interdependence	TI1	0.836	0.812	0.844	0.831	0.817	2.03
	TI2	0.820					2.15
	TI3	0.841					2.23
	TI4	0.791					2.67
	TI5	0.856					2.80
	TI6	0.883					1.78

Notes: α: Cronbach's α; CR: composite reliability; ρA: Dijstra-Henseler's rho; AVE: average variance extracted; [a]percentage of variance of item explained by the latent variable.

The evaluation of formative measurement models requires the multicollinearity test between the items that make up the constructs, as well as the analysis of factor loadings between the items and constructs in order to validate them (Hair et al., 2013). The degree of multicollinearity was measured using the variance inflation factor (VIF) and the tolerance value of the independent constructs. Tolerance values for all constructs are less than 0.10, as recommended by Hair et al (2013) and the VIF values of the items ranged between 1.44 and 2.81 (Table 2), indicating that there is no multicollinearity between the items. All of them were significant at the 0.05 level after bootstrapping with 5000 samples.

Convergent validity is assessed by estimating the mean of the extracted variance (AVE), which indicates the amount of variance shared by the items that make up the constructs. The AVE values of all constructs are above the minimum acceptable value of 0.50, as recommended by Hair et al. (2013). In addition, the CFA measures the factor loading, which indicates the contribution of each item in relation to the latent construct variance, in order to complement the convergent validity assessment. As shown in Table 2, all items have a factor loading greater than 0.70, indicating that they are relevant for the formation of constructs (Hair et al., 2013).

The discriminant validity of the measurement model, in turn, is used to assess how distinct a latent construct is from other constructs (Hair et al., 2013). In order to fulfill the discriminant validity condition, the square root of the AVE values of each construct must be superior to the other correlations (Fornell & Larcker, 1981). Table 2 shows that all constructs are statistically different from the others, as they have a square root of AVE higher than the correlations. Furthermore, in order to complement the discriminant analysis test, Table 3 also presents the Heterotrait-Monotrait (HTMT) values. All values above the diagonal are less than 0.85, indicating that there is discriminant validity (Henseler et al., 2015).

Table 3. Discriminant validity – correction matrix and Heterotrait-Monotrait (HTMT) ratio.

Construct	Form	Cent	Int	KAC	KGC	KCC	CIT	IT
Form	*0.881*	0.344	0.288	0.120	0.190	0.216	0.145	0.166
Cent	0.320	*0.844*	0.218	0.188	0.288	0.268	0.253	0.255
Int	0.263	0.193	*0.862*	0.293	0.283	0.317	0.388	0.289
KAC	0.131	0.164	0.267	*0.825*	0.304	0.283	0.293	0.235
KGC	0.188	0.224	0.243	0.328	*0.820*	0.316	0.351	0.212
KCC	0.105	0.235	0.288	0.253	0.265	*0.846*	0.222	0.246
CIT	0.089	0.318	0.315	0.342	0.388	0.213	*0.901*	0.188
IT	0.123	0.194	0.288	0.091	0.133	0.148	0.215	*0.912*

Notes: The values of diagonal cells (italics) refer to the square root values of AVE; below diagonal elements are the correlations between constructs; above diagonal elements are the HTMT ratio values.

4 Results

4.1 Structural model and hypothesis testing

The bootstrap procedure with 5000 samples was used in Smart-PLS in order to test the significance of the paths (β) within the structural model (Hair et al., 2013). The results of the structural model (Table 4) show that formalization has a significant negative relationship in relation to KAC and KGC, and a positive relationship in relation

to KCC. Centralization showed a significant negative relationship in relation to the three dimensions of dynamic capability. As for integration, this showed a significant positive impact in relation to KGC and KCC, and did not present a significant impact in relation to KAC. Assessing the relationship between the dimensions of knowledge-based dynamic capability and the teams' innovative capacity, both KGC and KCC were positively related to innovative performance, and KAC, in turn, did not show a significant relationship. As for the control variables, he observed that while the interdependence of tasks was positively related to the innovative performance of the teams, the team size and time in the team did not show a significant relationship.

Table 4. Structural model analysis.

Hypothesis	Relationship	Path coefficient	t-statistics	p-value	Sig. level	Results	f^2
H1a	Form → KAC(-)	-0.255	-2.560	0.000	***	Supported	0.218
H1b	Form → KGC(-)	-0.203	-1.983	0.004	**	Supported	0.162
H1c	Form → KCC(+)	0.117	1.119	0.043	*	Supported	0.094
H2a	Cent → KAC(-)	-0.295	-2.873	0.000	***	Supported	0.236
H2b	Cent → KGC(-)	-0.227	-.2115	0.003	**	Supported	0.182
H2c	Cent → KCC(-)	-0.124	-1.308	0.038	*	Supported	0.100
H3a	Int → KAC(+)	0.072	0.691	0.062	NS	Not Supported	0.042
H3b	Int → KGC(+)	0.337	4.436	0.000	***	Supported	0.270
H3c	Int → KCC(+)	0.438	5.222	0.000	***	Supported	0.343
H4a	KAC → CIT(+)	0.078	0.765	0.056	NS	Not Supported	0.046
H4b	KGC → CIT(+)	0.493	6.125	0.000	***	Not Supported	0.394
H4c	KCC → CIT(+)	0.555	7.842	0.000	***	Supported	0.444
Control Variables	TAT → CIT	-0.069	0.584	0.067	NS	Not Supported	0.040
	TET → CIT	0.128	1.290	0.037	*	Not Supported	0.105
	TI → CIT	0.080	0.792	0.055	NS	Supported	0.049

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; NS: Not Significant.

The results of the PLS analysis indicated a strong explanatory power of the model in relation to dynamic capability and innovative performance with coefficient of determination (R^2) of 0.37 and 0.46, respectively. The overall quality of the model was assessed by the goodness-of-fit index (GoF), which is calculated from the geometric mean of the AVE of the latent variables and the mean of the R^2 of the endogenous variables (Tenenhaus et al., 2005). The calculated GoF was 0.437, exceeding the cut-off value of 0.36 (Wetzels et al., 2009). In addition, the predictive quality of the proposed model was evaluated using the Stone-Geisser (Q^2). A Q^2 value above zero suggests that the model has acceptable predictive validity (Geisser, 1975). In the model of this study, Q2 is 0.45 in relation to the dynamic capability and 0.52 in relation to the innovative performance of teams, supporting the hypotheses of this study. Effect size

values (f^2) were calculated to measure the level of importance of an independent variable over a dependent variable in the structural model. The threshold values for small, medium and large effect are 0.02, 0.15 and 0.35, respectively (Chin, 2010). As indicated in Table 4, except for the refuted hypotheses (H3a, H4a) and the control variables Team size and Time in the team, which have low f^2 values, the other hypotheses have medium or high f^2 values.

5 Discussions and conclusions

Previous research contributes to theory by studying the relationship between organizational structure and team performance (Walheiser et al., 2021; Chión et al., 2019; Burcharth et al., 2015; Chen et al., 2010; Damanpour, 1991) and the impact of dynamic capability on innovative team performance (Zotoo et al., 2021; Gonzalez & Melo, 2021), however, there is a gap in the literature that simultaneously accesses two antecedents of team performance of project: the dynamic capability based on knowledge and the organizational structure. This study extends the contribution of previous work by proposing that the ability of a project team to absorb external knowledge and coordinate, create and combine internal knowledge is a critical factor for increasing innovative capacity. In addition, this study highlights that the organizational structure model, with regard to formalization, centralization and integration, will impact team innovation, and this relationship is mediated by knowledge-based dynamic capability. This study is conducted in the context of the industrial sector, an environment permeated by the development of teamwork, aimed at innovating products, processes and systems.

The results of our model initially show that formalization has a negative relationship with KAC and KGC and a positive relationship with KCC. Most studies, such as Damanpour (1991); Thompson (1965), Chen et al. (2010), Chión et al. (2019) and Walheiser et al. (2021), point out that formalization negatively impacts the innovative process, while other works such as Evanschitzky et al. (2012) and Henard & Szymanski (2001) highlight a positive impact on this relationship. This study contributes to the current literature by demonstrating the interactions not only of formalization, but also of centralization and integration, with the three dimensions of dynamic capability, elucidating the positive and negative points of each aspect of the structure. Formalization implies the development of rules and procedures, which must be followed by the members of the organization. Taking into account that the acquisition of external knowledge and the creation of knowledge depend on a context that offers freedom to the individual to assimilate and develop exploratory learning, formalization acts in the opposite way, imposing rules and assumptions that restrict this demanded state of freedom by KAC and KGC. In contrast, in line with the results of Jansen et al. (2006) and Ali et al. (2019), formalization creates an organizational memory, which is essential for the combination of knowledge, via transformative and exploitative learning. In this perspective, formalization helps the organization's members and teams to rescue the retained knowledge and combine it into new applications aimed at improving processes or products.

Regarding centralization, our study shows that centralization has a negative relationship with the three dimensions of dynamic capability (KAC, KGC and KCC). Thus, our results oppose the notion of ambidextrous model proposed by authors such as Duncan (1976), Jansen et al. (2006) and Ali et al. (2019) who advocate that organic structures, that is, less centralized and formalized, are positive for the development of innovation, referring to the

dimension of knowledge acquisition; while mechanical structures, that is, more centralized and formalized, have a positive effect on the implementation of innovation, corresponding to the dimensions of knowledge generation and combination. Centralization limits the ability of lower-level employees to use specific knowledge in problem solving or process improvement. This restriction becomes problematic since higher hierarchical level managers do not always have great affinity with the problems exposed by products, processes, and also by organizational systems, limiting the ability to generate and combine knowledge. In line with Jansen et al. (2006) and Chión et al. (2019), a high level of centralization reduces the ability to acquire knowledge, as the absorption of external knowledge requires a non-routine and structured process of external alliances, deviating from existing knowledge. These results are very relevant within the context of project teams, since, normally, the members of these teams have a high degree of autonomy that supports individual and collective learning.

Integration is the third aspect of organizational structure considered in our analysis. Our study shows that integration is positively related to KGC and KCC, and did not present a significant relationship with KAC. Results found by Ali et al. (2019), Gonzalez & Melo (2019) and Zheng et al. (2010) indicate that integration is beneficial for the phases of absorption, assimilation and transformation of knowledge. Conversely, when we analyze the process of knowledge absorption or acquisition, our study shows that integration does not have a significant impact. This result is explained by the fact that absorption is a process related to specific and specialized knowledge (Kim, 1980). Conversely, the knowledge generation and combination phases require a collective learning process, which is not the result of individual effort or a simple department or specialized function, on the contrary, these dimensions of dynamic capability require the integration of individuals and areas functional. The project teams present a favorable environment that encourages this integrative and multidisciplinary characteristic of knowledge. In this way, we can say that specialized knowledge is acquired in functional areas, being integrated, combined and transformed in project teams.

This research also assesses the relationship between the dynamic capability based on knowledge and the innovative capacity of teams. The results of the study show that while KGC and KCC had a positive impact, KAC does not interfere in the innovative capacity of project teams. The work by Zheng et al. (2011) is seminal in analyzing the relationship between knowledge-based dynamic capability and innovation. The results found by these authors differ in finding a positive relationship between KAC and innovative performance. This difference in results can be explained by the context in which the surveys are applied. While Zheng and his colleagues analyzed innovation by manufacturing companies without focusing on a specific department or function within those firms, our research focuses on project teams. In the context of project teams, it is suggested that the specialized knowledge has already been acquired by the functional areas, which make it available for activities with the purpose of innovating, improving or solving problems with products, processes or systems. Thus, while KAC does not have a positive relationship, KGC and KCC are highly related to the innovative performance of project teams, since the project activity focuses on these two dimensions of dynamic capability.

5.1 Limitations and future research

Like most empirical research, this study has a number of limitations that must be considered. First, we study the overall impact of organizational structure on knowledge-based dynamic capability, and its effects, in turn, on the innovative performance of

project teams. However, this approach limits the understanding of how each aspect of the organizational structure (formalization, centralization and integration) individually interferes with the dynamic capability and innovative performance. Thus, future studies may consider the study of the individual effect of each characteristic of the organizational structure on dynamic capability and innovation.

Second, we used cross-sectional data in this study. However, the literature indicates that the characteristics of organizational structure and dimensions of dynamic capability are developed over time (Zheng et al., 2011). Therefore, the effects of organizational structure and dynamic capability on innovation may differ depending on team management. Thus, future works may consider longitudinal data in order to demonstrate more realistic results.

Third, although many studies show satisfactory results with small samples using PLS, we recognize the small sample size as a limitation of this study and hope that future studies will build on our results, expanding the sample size. Fourth, this research is conducted in Brazilian industry and the results cannot be expanded to other organizations and cultures. In this way, we hope that, in the future, researchers will access the results of this research and verify if they are compatible with other sectors, such as services, and different cultures. Fifth, the Brazilian industrial sector is quite large, with variations in the demand for innovation, qualification of the workforce, among other aspects. Thus, future works may consider the industrial sector as a control variable.

References

Acharya, A., & Mishra, B. (2017). Exploring the relationship between organizational structure and knowledge retention: a study of the Indian infrastructure consulting sector. *Journal of Knowledge Management*, 21(4), 961-985. http://dx.doi.org/10.1108/JKM-11-2016-0506.

Ali, A., Bahadur, W., Wang, N., Luqman, A., & Khan, A. N. (2020). Improving team innovation performance: role of social media and team knowledge management capabilities. *Technology in Society*, 61, 101259. http://dx.doi.org/10.1016/j.techsoc.2020.101259.

Ali, A., Wang, H., Khan, A. N., Pitafi, A. H., & Amin, M. W. (2019). Exploring the knowledge-focused role of interdependent members on team creative performance. *Asian Business & Management*, 18(2), 98-121. http://dx.doi.org/10.1057/s41291-018-00050-2.

Andrews, M. C., & Kacmar, K. M. (2001). Discriminating among organizational politics, justice, and support. *Journal of Organizational Behavior*, 22(4), 347-366. http://dx.doi.org/10.1002/job.92.

Biemann, T., Cole, M. S., & Voelpel, S. (2012). Within-group agreement: on the use (and misuse) of rWG and rWG(J) in leadership research and some best practice guidelines. *The Leadership Quarterly*, 23(1), 66-80. http://dx.doi.org/10.1016/j.leaqua.2011.11.006.

Brandon-Jones, A., & Knoppen, D. (2018). The role of strategic purchasing in dynamic capability development and deployment: a contingency perspective. *International Journal of Operations & Production Management*, 38(2), 446-473. http://dx.doi.org/10.1108/IJOPM-10-2015-0656.

Burcharth, A. L. L., Lettl, C., & Ulhoi, J. P. (2015). Extending organizational antecedents of absorptive capacity: organizational characteristics that encourage experimentation. *Technological Forecasting and Social Change*, 90, 269-284. http://dx.doi.org/10.1016/j.techfore.2013.12.024.

Burns, T., & Stalker, M. (1961). *The management of innovation*. London: Tavistock Publications.

Burpitt, W. J., & Bigoness, W. J. (1997). Leadership and innovation among teams. *Small Group Research*, 28(3), 414-423. http://dx.doi.org/10.1177/1046496497283005.

Calabuig, V., Olcina, G., & Panebianco, F. (2018). Culture and team production. *Journal of Economic Behavior & Organization*, 149, 32-45. http://dx.doi.org/10.1016/j.jebo.2018.03.004.

Centro das Indústrias do Estado de São Paulo - CIESP. (2021). Retrieved in 2020, July 15, from http://ebgebrasil.com.br/industrias/sp

Chen, C.-J., Huang, J.-W., & Hsiao, Y.-C. (2010). Knowledge management and innovativeness: the role of organisational climate and structure. *International Journal of Manpower*, 31(8), 848-870. http://dx.doi.org/10.1108/01437721011088548.

Chin, W. W. (2010). How to write up and report PLS analyses. In V. Esposito Vinzi, W. Chin, J. Henseler & H. Wang (Eds.), *Handbook of partial least squares* (pp. 655-690). Berlin: Springer. . http://dx.doi.org/10.1007/978-3-540-32827-8_29.

Chión, S. J., Charles, V. C., & Morales, J. (2019). The impact of organizational culture, organizational structure and technological infrastructure on process improvement through knowledge sharing. *Business Process Management Journal*, 26(6), 1443-1472. http://dx.doi.org/10.1108/BPMJ-10-2018-0279.

Choi, S. Y., Lee, Y., & Yoo, Y. (2010). The impact of information technology and transactive memory systems on knowledge sharing, application, and team performance: a field study. *Management Information Systems Quarterly*, 34(4), 855-870. http://dx.doi.org/10.2307/25750708.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128-152. http://dx.doi.org/10.2307/2393553.

Damanpour, F. (1991). Organizational innovation: a meta-analysis of effects of determinants and moderators. *Academy of Management Journal*, 34(3), 555-590.

Damanpour, F., & Gopalakrishnan, S. (1998). Theories of organizational structure and innovation adoption: the role of environmental change. *Journal of Engineering and Technology Management*, 15(1), 1-24. http://dx.doi.org/10.1016/S0923-4748(97)00029-5.

Denford, J. S. (2013). Building knowledge: developing a knowledge-based dynamic capabilities typology. *Journal of Knowledge Management*, 17(2), 175-194. http://dx.doi.org/10.1108/13673271311315150.

Duncan, R. B. (1976). The ambidextrous organization: designing dual structures for innovation. In R. H. Kilmann, L. R. Pondy & D. P. Slevin (Eds.), *Strategy and implementation* (Vol. 1, pp. 167-188). New York: North-Holland Publishing.

Evanschitzky, H., Eisend, M., Calantone, R. J., & Jiang, Y. (2012). Success factors of product innovation: an updated meta-analysis. *Journal of Product Innovation Management*, 29, 21-37. http://dx.doi.org/10.1111/j.1540-5885.2012.00964.x.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *JMR, Journal of Marketing Research*, 18(1), 39-50. http://dx.doi.org/10.1177/002224378101800104.

Geisser, S. (1975). The predictive sample reuse method with applications. *Journal of the American Statistical Association*, 70, 320-328.

Germain, R. (1996). The role of context and structure in radical and incremental logistics innovation adoption. *Journal of Business Research*, 35(2), 117-127. http://dx.doi.org/10.1016/0148-2963(95)00053-4.

Gonzalez, R. V. D., & Melo, T. M. (2019). Analyzing dynamic capability in teamwork. *Journal of Knowledge Management*, 23(6), 1196-1217. http://dx.doi.org/10.1108/JKM-08-2018-0478.

Gonzalez, R. V. D., & Melo, T. M. (2021). How do autonomy, cohesion and integration of teamwork impact the dynamic capability? *Total Quality Management & Business Excellence*, 32(7-8), 794-810. http://dx.doi.org/10.1080/14783363.2019.1636640.

Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(S2), 109-122. http://dx.doi.org/10.1002/smj.4250171110.

Griffin, A., & Hauser, J. R. (1996). Integrating R&D and marketing: a review and analysis of the literature. *Journal of Product Innovation Management*, 13(3), 191-215. http://dx.doi.org/10.1111/1540-5885.1330191.

Gupta, A. K. (2021). Innovation dimensions and firm performance synergy in the emerging market: a perspective from dynamic capability theory & signaling theory. *Technology in Society*, 64, 101512. http://dx.doi.org/10.1016/j.techsoc.2020.101512.

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2013). *A primer on partial least squares structural equation modeling (PLS-SEM)*. London: Sage.

Henard, D. H., & Szymanski, D. M. (2001). Why some new products are more successful than others. *JMR, Journal of Marketing Research*, 38(3), 362-375. http://dx.doi.org/10.1509/jmkr.38.3.362.18861.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115-135. http://dx.doi.org/10.1007/s11747-014-0403-8.

Hermano, V., & Martín-Cruz, N. (2016). The role of top management involvement in firms performing projects: a dynamic capabilities approach. *Journal of Business Research*, 69(9), 3447-3458. http://dx.doi.org/10.1016/j.jbusres.2016.01.041.

Jansen, J. J. P., van Den Bosch, F. A. J., & Volberda, H. W. (2006). Exploratory innovation, exploitative innovation, and performance: effects of organizational antecedents and environmental moderators. *Management Science*, 52(11), 1661-1674. http://dx.doi.org/10.1287/mnsc.1060.0576.

Jansen, J. J. P., van den Bosch, F., & Volberda, H. (2005). Managing potential and real-ized absorptive capacity: how do organizational antecedents matter? *Academy of Management Journal*, 48(6), 999-1015. http://dx.doi.org/10.5465/amj.2005.19573106.

Kanawattanachai, P., & Yoo, Y. (2007). The impact of knowledge coordination on virtual team performance over time. *Management Information Systems Quarterly*, 31(4), 783-808. http://dx.doi.org/10.2307/25148820.

Kim, L. (1980). Organizational innovation and structure. *Journal of Business Research*, 8(2), 225-245. http://dx.doi.org/10.1016/0148-2963(80)90012-0.

Liao, C., Chuang, S., & To, P. (2011). How knowledge management mediates the relationship between environment and organizational structure. *Journal of Business Research*, 64(7), 728-736. http://dx.doi.org/10.1016/j.jbusres.2010.08.001.

Lin, H. E., Hsu, I. C., Hsu, A. W., & Chung, H. M. (2020). Creating competitive advantages: interactions between ambidextrous diversification strategy and contextual factors from a dynamic capability perspective. *Technological Forecasting and Social Change*, 154, 1-11. http://dx.doi.org/10.1016/j.techfore.2020.119952.

Liu, M. L., Lin, C. P., Joe, S. W., & Chen, K. J. (2019). Modeling knowledge sharing and team performance: the interactions of ethical leadership and ambidexterity with politics and job complexity. *Management Decision*, 57(7), 1472-1495. http://dx.doi.org/10.1108/MD-01-2017-0052.

Mahmud, M., Soetanto, D., & Jack, S. (2020). Environmental management and product innovation: the moderating role of the dynamic capability of small manufacturing firms. *Journal of Cleaner Production*, 264, 121633. http://dx.doi.org/10.1016/j.jclepro.2020.121633.

Martínez-Román, J. A., Gamero, J., Tamayo, J. A., & Delgado-González, L. (2020). Empirical analysis of organizational archetypes based on generation and adoption of knowledge and technologies. *Technovation*, 96-97, 102145. http://dx.doi.org/10.1016/j.technovation.2020.102145.

Mell, J. N., van Knippenberg, D., & van Ginkel, W. P. (2013). The catalyst effect: the impact of transactive memory system structure on team performance. *Academy of Management Journal*, 57(4), 1154-1173. http://dx.doi.org/10.5465/amj.2012.0589.

Mihalache, O. R., Jansen, J. J. P., van den Bosch, F. A. J., & Volberda, H. W. (2014). Top management team shared leadership and organizational ambidexterity: a moderated mediation framework. *Strategic Entrepreneurship Journal*, 8(2), 128-148. http://dx.doi.org/10.1002/sej.1168.

Monteiro, G. P., Hopkins, A., & Melo, P. F. F. (2020). How do organizational structures impact operational safety? Part 1–Understanding the dangers of decentralization. *Safety Science*, 123, 104568. http://dx.doi.org/10.1016/j.ssci.2019.104568.

Nath, P., & Ramanathan, R. (2016). Environmental management practices, environmental technology portfolio, and environmental commitment: a content analytic approach for UK manufacturing firms. *International Journal of Production Economics*, 171(3), 427-437. http://dx.doi.org/10.1016/j.ijpe.2015.09.040.

Nonaka, I., & Takeuchi, H. (1995). *The knowledge creation company: how japanese companies create the dynamics of innovation*. New York: Oxford University Press.

Ruekert, R. W., Walker, O. C., Jr., & Roering, K. J. (1985). The organization of marketing activities: acontingency theory of structure and performance. *Journal of Marketing*, 49(1), 13-25. http://dx.doi.org/10.1177/002224298504900102.

Shepard, H. A. (1967). Innovation-resisting and innovation-producing organizations.*The Journal of Business*, 40(4), 470-477.

Szymanski, D. M., Kroff, M. W., & Troy, L. C. (2007). Innovativeness and new product success: insights from the cumulative evidence. *Journal of the Academy of Marketing Science*, 35(1), 35-52. http://dx.doi.org/10.1007/s11747-006-0014-0.

Teece, D. J., Peteraf, M., & Leih, S. (2016). Dynamic capabilities and organizational agility. *California Management Review*, 58(4), 13-35. http://dx.doi.org/10.1525/cmr.2016.58.4.13.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509-533. http://dx.doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z.

Tenenhaus, M., Vinzi, V. E., Chatelin, Y. M., & Lauro, C. (2005). PLS path modeling. *Computational Statistics & Data Analysis*, 48(1), 159-205. http://dx.doi.org/10.1016/j.csda.2004.03.005.

Thompson, V. A. (1965). Bureaucracy and innovation. *Administrative Science Quarterly*, 10(1), 1-20. http://dx.doi.org/10.2307/2391646.

Walheiser, D., Schwens, C., Steinberg, P. J., & Cadogan, J. W. (2021). Greasing the wheels or blocking the path? Organizational structure, product innovativeness, and new product success. *Journal of Business Research*, 126, 489-503. http://dx.doi.org/10.1016/j.jbusres.2020.12.021.

Wang, C. L., Senaratne, C., & Rafiq, M. (2015). Success traps, dynamic capabilities and firm performance. *British Journal of Management*, 26(1), 26-44. http://dx.doi.org/10.1111/1467-8551.12066.

Wetzels, M., Odekerken-Schröder, G., & Van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: guidelines and empirical illustration. *MIS Quartely*, 33(1), 177-195. http://dx.doi.org/10.2307/20650284.

Winter, S. G. (2003). Understanding dynamic capabilities. *Strategic Management Journal*, 24(10), 991-995. http://dx.doi.org/10.1002/smj.318.

Zahra, S. A., & George, G. (2002). Absorptive capacity: a review, reconceptualization, and extension. *Academy of Management Review*, 27(2), 185-203. http://dx.doi.org/10.2307/4134351.

Zheng, S., Zhang, W., & Du, J. (2011). Knowledge-based dynamic capabilities and innovation in networked environments. *Journal of Knowledge Management*, 15(6), 1035-1051. http://dx.doi.org/10.1108/13673271111179352.

Zheng, W., Yang, B., & McLean, G. N. (2010). Linking organizational culture, structure, strategy, and organizational effectiveness mediating role of knowledge management. *Journal of Business Research*, 63(7), 763-771. http://dx.doi.org/10.1016/j.jbusres.2009.06.005.

Zollo, M., & Winter, S. G. (2002). Deliberate learning and the evolution of dynamic capabilities. *Organization Science*, 13(3), 339-351. http://dx.doi.org/10.1287/orsc.13.3.339.2780.

Zotoo, I. K., Lu, Z., & Liu, G. (2021). Big data management capabilities and librarians' innovative performance: the role of value perception using the theory of knowledge-based dynamic capability. *Journal of Academic Librarianship*, 47(2), 102272. http://dx.doi.org/10.1016/j.acalib.2020.102272.

Appendix A. Measurement items.

Organizational Structure

Formalization

Form1. The firm has a large number of explicit work rules and policies

Form2. Employees follow the clearly defined task procedures made by the firm

Form3. The firm relies on strict supervision in controlling day-to-day operation

Centralization

Cent 1. Employees have autonomy to do their work

Cent 2. Employees participate in the decision-making process

Cent 3. Employees search for problem solutions from many channels

Integration

Int 1. The firm integrates vertically

Int 2. The firm integrates horizontally

Knowledge Acquisiton Capability (KAC) – Knowledge Acquisition Capability

KAC 1. Our firm acquires technological knowledge

KAC 2. Our firm acquires market knowledge

KAC 3. Our firm acquires managerial knowledge

KAC 4. Our firm acquires knowledge of processes and manufacturing

KAC 5. Our firm acquires other knowledge and skills

Knowledge Generation Capability (KGC) - Knowledge Generation Capability

KGC 1. Our firm creates technological knowledge

KGC 2. Our firm creates market knowledge

KGC 3. Our firm creates managerial knowledge

KGC 4. Our firm creates knowledge

KGC 5. Our firm creates relational knowledge

Knowledge Combination Capability (KCC) - Knowledge Combination Capability

KCC 1. Our firm combines internal and external knowledge

Our firm could combine internal and external knowledge

KCC 2. Our firm integrates knowledge from different departments, teams and individuals

Our firm could integrate knowledge from different segments, team and individuals

KCC 3. Our firm combines knowledge of different technological and market areas

Our firm could combine knowledge in different technological or market fields

KCC 4. Our firm combines new knowledge with current knowledge

Our firm could combine new knowledge with original knowledge pool

KCC 5. Our firm adapts the internal structure and processes to effectively combine knowledge

Our firm could adapt the internal structure and process to combine knowledge effectively

KCC 6. Our firm coordinates internal and external networks to effectively contribute to organizational knowledge

Innovative capacity of teams (CIT)

CIT 1. Using the skills they already possess, this team learns new ways to apply those skills to develop new products that can help attract and serve new markets.

CIT 2. The team seeks information about new markets, products, and technologies from sources outside the organization.

CIT 3. This team identifies and develops skills that can improve its ability to meet existing business needs

CIT 4. This team identifies and develops skills that can help attract and meet changing business needs

CIT 5. This team learns new ways to apply their knowledge of familiar products and techniques to develop new and unusual solutions to routine problems

CIT 6. This team seeks information about new products and techniques for the operation and learns how to apply them to develop new solutions to routine problems.

CIT 7. This team seeks and acquires information that can be useful in developing multiple solutions to problems.

CIT 8. This team seeks and acquires knowledge that can be useful in meeting unanticipated needs by the client.

Task interdependence (IT)

IT1. I often have to coordinate my efforts with other team members.

IT2. Achieving individual goals helps to reach the goal of others.

IT3. For the team to perform well, members must communicate well.

IT4. To achieve high performance, it's important that we trust each other.

IT5. The jobs performed by different team members are related to each other.

IT6. The success of one team member implies the success of others.