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Innovative behaviors: A survey about their associated effects in a dynamic environment

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Abstract

Purpose – New organizational arrangements are crucial for firms that want to innovate, particularly for those that are highly dependent on digital technologies. Hence, innovative behaviors play a vital role in resetting organizational practices. This research examines the impact of innovative ideas on innovation performance-oriented behaviors and tries to understand the role of employees' experimentation and collaboration-oriented behaviors.

Theoretical framework – The organizational behavior and innovation literature is the theoretical lens used to support research.

Design/methodology/approach – The literature review focuses on a stream of research on innovative behaviors, raising questions about behavioral relationships. A set of hypotheses is tested through structural equation modeling (SEM) to investigate the associated effects of innovative ideas, experimentation, collaboration, and innovative performance-oriented behaviors in a digital transformative context. The sample consists of 106 employees from a Brazilian e-commerce firm.

Findings –The findings reveal that only collaboration-oriented behaviors have a positive mediating effect between innovative ideas and innovation performance-oriented behaviors. Experimentation-oriented behaviors have no effect as mediators on innovation performance-oriented behaviors or as influencers on collaboration-oriented behaviors. Innovative ideas have no direct effect on innovation performance-oriented behaviors, but they do have a positive effect when mediated by collaboration and experimentation.

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Practical & social implications of research – Collaboration and experimentation-oriented behaviors are explored separately, and this distinction is also important for innovation management theory and for firms by showing how two specific types of behaviors, which are differently correlated, influence innovation performance-oriented behaviors in dynamic environments.

Originality/value – The study's main contribution is related to it demonstrating the value of innovative behaviors for innovation management in practice, showing that a different behavioral approach can support firms in achieving innovativeness.

Keywords: Collaborative behavior, experimental behavior, innovative ideas, innovation performance, employees' behaviors.

1 Introduction

Innovative behavior refers to pioneering behaviors and initiatives to discover opportunities for innovation (Rauch et al., 2009; Segarra-Ciprés et al., 2019), particularly in dynamic technological environments, where the pressure for innovative ideas is crucial for business development. According to Segarra-Ciprés et al. (2019), despite the benefits of innovative behavior for both individuals and firms, several questions remain unanswered regarding behaviors that positively affect innovation (Segarra-Ciprés et al., 2019).

Previous research has investigated how numerous factors shape innovative behavior. For example, one stream has examined individual factors such as self-efficacy (Nisula & Kianto, 2016), motivations (Chiu, 2018), work ethics (Mussner et al., 2017), and employee attitudes (Arshad et al., 2020; Lichtenthaler, 2020). Other authors have investigated how intraorganizational and contextual factors such as job design (Dorenbosch et al., 2005), leadership style (Norouzinik et al., 2022; Schiuma et al., 2021), organizational conflicts (Schweisfurth & Raasch, 2020), culture (Tsegaye et al., 2019; Zhu et al., 2018), HR systems (Abstein & Spieth, 2014), or job insecurity (Van Hootegem et al., 2019) also affect innovative behavior.

However, the interrelationship between innovative behaviors is a promising field that has not yet been explored to understand innovation within firms and delve deeper into the role of employees' innovative behaviors (Rigtering & Weitzel, 2013). Therefore, this study uses the literature on innovative behaviors and their relationships, perspectives, and influences in an interactionist approach to the innovation context, exploring organizational and individual factors to understand how employees' behaviors inhibit or foster creativity and innovation at work (Woodman et al., 1993).

Innovative behaviors are characterized as innovative ideas (Janssen, 2000; Norouzinik et al., 2022), collaboration-oriented behaviors (Ben Jouida et al., 2021; Chiu, 2018; Ruijter et al., 2021), experimentation-oriented behaviors (Arribas et al., 2012; Lee et al., 2004; Swailes, 2004), and innovation performance-oriented behaviors (Janssen, 2000; Norouzinik et al., 2022) that lead firms to innovation performance (Segarra-Ciprés et al., 2019). Innovative ideas are solutions to difficult issues or new ways of working in terms of methods, techniques, or tools (Janssen, 2000; Norouzinik et al., 2022). Collaboration-oriented behaviors are actions involving predisposition and proactiveness to facilitate innovations (Labitzke et al., 2014; Segarra-Ciprés et al., 2019). Experimentation-oriented behaviors are defined as trial-and-error processes in which each trial generates new ideas or insights about a problem (Allen, 1984; Lee et al., 2004; Shalley & Gilson, 2004; Thomke, 1998). And innovation performance-oriented behaviors are actions to institutionalize processes such as the informal and formal control of innovative ideas (Segarra-Ciprés et al., 2019).

We empirically analyze the direct and mediating effects of collaboration and experimentation-oriented behavior on the relationship between innovative ideas and innovation performance-oriented behaviors, and investigate the direct effect of innovative ideas on innovation performance-oriented behaviors to answer the research question: *How are the effects of innovative behaviors associated in a dynamic environment?*

Using confirmatory factor analysis (CFA) and structural equation modeling (SEM) methods, this study explores a sample of 106 leaders from a Brazilian e-commerce firm to understand how innovative behaviors affect an environment of technology integration that is considered innovative by the firm. The findings reveal that innovative behaviors positively interact to achieve innovation performance-oriented behaviors in this business sector.

This study has theoretical contributions and practical implications. First, it is the first attempt to analyze the interrelationships among innovative behaviors. Second, it investigates the direct and mediating effects among four different innovative behaviors. Third, it attempts to study from an interactionist perspective how innovative behaviors themselves foster innovation in firms. Fourth, it provides practical and managerial implications to foster organizational contexts to increase the impact of innovative behaviors on firms' innovation challenges. Fifth, it demonstrates its relevance by offering a new vision among innovative behaviors as an opportunity to reset organizational practices that enable the creation of new future organizational arrangements to innovate. Finally, this study demonstrates how the behavioral aspects are relevant in innovation contexts to institutionalize ideas and process controls. It uncovers the intangible perspective of innovative behaviors in business management in dynamic environments.

The structure of the study is as follows. First, the theoretical framework for analyzing the relationships between innovative ideas, collaboration, experimentation, and innovation performance-oriented behaviors is presented. After outlining the methodological aspects and presenting the findings, the paper concludes with a discussion of the results and the main conclusions and theoretical and practical implications.

2 Theory and hypotheses

Innovative behaviors have been analyzed in organizational behavior and innovation literature, where proactive behaviors lead employees from innovative ideas to search for solutions to innovation problems (Hassi & Rekonen, 2018; Natalicchio et al., 2017). Researchers pursue the demonstration of innovative or proactive behaviors in collaboration to promote innovation performance, particularly in technological environments, where business dynamism pushes for more innovative ideas from employees and self-initiated behaviors oriented toward change (Kraus et al., 2012; Rauch et al., 2009; Segarra-Ciprés et al., 2019). Additionally, several authors (Bolino et al., 2010; Strauss et al., 2015) suggest that innovative behaviors involve a number of resources, such as time, organizational support, or job satisfaction. A work context where collaboration and experimentation-oriented behaviors are encouraged gives employees the opportunities and assistance they need to propose innovative ideas and contributes to innovation performance-oriented behaviors (Norouzinik et al., 2022; Tamayo-Torres et al., 2016).

In this section, innovative behaviors are conceptualized under the interactionist perspective and explored in four different aspects, namely innovative ideas (Janssen, 2000; Norouzinik et al., 2022), collaboration-oriented behaviors (Ben Jouida et al., 2021; Chiu, 2018; Ruijter et al., 2021), experimentation-oriented behaviors (Arribas et al., 2012; Lee et al., 2004; Swailes, 2004), and innovation performance-oriented behaviors (Janssen, 2000; Norouzinik et al., 2022), in order to develop the hypotheses.

2.1 Interactionist perspective on Innovative Behaviors

The interactionist perspective assumes that employees who are willing to take risks tend to exhibit behaviors that go beyond the requirements and formal expectations instead of following prescribed methods of working (Al-Hawari et al., 2021; Schneider & Reichers, 1983). It also emphasizes the situational role of behaviors in interaction with employees' personality (Fleeson & Noftle, 2009). Although the seminal interactionist research showed that employee profiles intensify the positive effects of supportive contextual factors on organizational outcomes, including innovations (Oldham & Cummings, 1996; Tierney et al., 1999), other research (Liu et al., 2011; Madjar et al., 2002) showed that these profiles can also weaken these contexts. Zhou and Hoever's (2014) review also highlighted that although the interactionist view is generally supported, the research does not delineate the different processes that give rise to different patterns of interactions (Zhou & Hoever, 2014).

Furthermore, considering that the interactionist perspective in employee contexts suggests that contextual factors interact with their profile characteristics to affect intrinsic motivation (Al-Ghazali, 2023; Chen et al., 2016), this study aims to understand, in a specific business context, how employees' innovative ideas influence innovation performance behaviors through the mediation of collaboration and experimentation behaviors. Some authors (Al-Ghazali, 2023; Liu et al., 2011; Zhang et al., 2020; Zhou et al., 2012) took an interactionist perspective to show that person-context interactions are related to innovative behaviors, specifically innovative ideas and creativity.

Recently, Al-Ghazali (2023) suggested that "[...] an alternative mechanism of the interactionist perspective on innovation might be worth exploring. And from a theoretical standpoint, the inherent tension between employees and innovation process contexts should be more explored" (Al-Ghazali, 2023, p. 231).

In this sense, this study sheds light on an additional process of interactions among innovative behaviors in a specific context to contribute to the interactionist perspective and behavioral process toward innovativeness.

2.2 Defining innovative ideas

Innovative behaviors refer to all individual actions at organizational levels that introduce, generate, and apply new ideas (Kleysen & Street, 2001; Norouzinik et al., 2022). Authors have discussed innovative behaviors under different dimensions (de Jong & Den Hartog, 2007; Norouzinik et al., 2022; Schweisfurth & Raasch, 2020), such as introduction, generation and application, when new ideas for difficult situations are regularly used from available knowledge to solve problems (Natalicchio et al., 2017; Norouzinik et al., 2022; Schweisfurth & Raasch, 2020).

Innovative ideas are also considered to be solutions for difficult issues, new ways of working (methods, techniques or tools) or efforts to inspire members of the organization (Janssen, 2000; Norouzinik et al., 2022). They can be individual or collective constructs that represent a way of behaving. The ability to behave individually or collectively derives from the combination of ideas and interactions between individuals (i.e., they engage in common processes and events and share knowledge) to trigger how to do things better, creating expectations for new achievements and fostering innovation performance-oriented behaviors (Segarra-Ciprés et al., 2019). Therefore, Hypothesis 1 reads as follows:

Hypothesis 1: Innovative ideas have a positive impact on innovation performance-oriented behaviors.

2.3 Collaboration-oriented behaviors as mediators

Regardless of job position or educational background, every employee can contribute to innovation (Kristiansen & Bloch-Poulsen, 2010; Segarra-Ciprés et al., 2019). Thus, from a behavioral perspective, innovation is fostered by employees' innovative behaviors (Griffin et al., 2007; Parker & Collins, 2010). Based on the interactionist perspective (Segarra-Ciprés et al., 2019), collaboration-oriented behaviors may promote innovative ideas among employees. Although collaboration-oriented behaviors can differ in terms of each employee's predisposition and proactiveness, the organizational context may facilitate or inhibit innovation performance-oriented behaviors (Labitzke et al., 2014; Segarra-Ciprés et al., 2019).

However, the level of employee collaboration affects the performance of innovative ideas. The idea promotion stage strives to remove organizational resistance and barriers to change and requires stronger organizational support and collaboration-oriented behaviors (Akram et al., 2020; Shane, 1994).

This perspective proposes that the link between employees' innovative ideas, organizational context, and innovation performance-oriented behaviors is most likely to be strengthened when stronger collaboration-oriented behaviors are perceived. In contrast, when organizational contexts do not provide support for innovative ideas, collaboration-oriented behaviors are less likely to be translated into innovation performance-oriented behaviors (Akram et al., 2020; Segarra-Ciprés et al., 2019).

Collaboration-oriented behaviors encourage employees to specify the obligations of each party in advance as a preparation for future performance in order to balance expectations and, consequently, influence innovation performance-oriented behaviors (Benítez-Ávila et al., 2018; Ruijter et al., 2021). For Latusek and Vlaar (2018), this is also referred to as the relational approach (Latusek & Vlaar, 2018), considering that not all innovative ideas will produce innovation performance, and some collaboration-oriented behaviors may fully or partially mediate this relationship to build future innovation opportunities (Benítez-Ávila et al., 2018; Ruijter et al., 2021). Therefore, Hypothesis 2 reads as follows:

Hypothesis 2: Innovative ideas will have a greater positive impact on innovation performance-oriented behaviors when mediated by collaboration-oriented behaviors.

2.4 Experimentation-oriented behaviors as mediators

Experimentation is defined as a trial-and-error process in which each trial generates new ideas or insights about a problem (Allen, 1984; Lee et al., 2004; Shalley & Gilson, 2004; Thomke, 1998). It is essentially about the practical application of an innovative idea or part of it (Hassi & Rekonen, 2018).

Experimentation-oriented behaviors are critical for innovation (Hassi & Rekonen, 2018; Lee et al., 2004). For example, scientific discoveries (such as COVID-19 vaccines) and technologies (such as artificial intelligence, blockchain, virtual reality, etc.) are outcomes of constant trial and error through which inventors systematically build a knowledge base to develop more precise innovation performance-oriented behaviors (Thomke, 2003).

They are fundamental to innovative problem-solving (Natalicchio et al., 2017), where results are uncertain and available information is insufficient (Lee et al., 2004).

Even if experimentation-oriented behaviors do not achieve the expected innovation performance, they generate some experience and learning for future innovative ideas, allowing for a better balance of innovation performance-oriented behaviors in new attempts (Hassi & Rekonen, 2018).

More broadly, employees who constantly improvise and experiment are able to remain adaptive in fast-paced industries, such as the e-commerce sector, where innovative ideas are in constant demand (Ciborra, 2009). However, failures of innovative ideas are unavoidable outcomes of experimentation because the outcome of any single experiment or trial is uncertain beforehand (Cannon & Edmondson, 2005; Lee et al., 2004).

Consistent with this description, employees who choose innovative ideas where failures are likely (rather than safe ideas where they can perform well) tend to persevere in the face of adversity and perform better in the long run than others (Dweck & Leggett, 2000). Therefore, experimentation-oriented behaviors seem to avoid likely failures (Thomke, 1998), increasing the level of innovation performance-oriented behaviors.

Additionally, failure avoidance can be explained by the interpersonal or social costs of failure (Lee et al., 2004). Specifically, failures manifest as gaps in the expertise, skills or knowledge of employees involved in the implementation of innovative ideas (Lee, 1997), and employees who avoid failures enhance their professional image among colleagues (Wolfe et al., 1986).

Experimentation-oriented behaviors also affect the "psychological safety of employees" (Edmondson, 2003, p. 1), who are potentially concerned about the risks of failure and want to increase the engagement of others in innovative ideas, thus affecting innovation performance-oriented behaviors to some extent. They are an important mediator to trigger innovation performance-oriented behaviors when there is an innovative idea to be implemented. Thus, Hypothesis 3 is as follows:

Hypothesis 3: Innovative ideas will have a greater positive impact on innovation performance-oriented behaviors when mediated by experimentation-oriented behaviors.

2.5 Innovation performance-oriented behaviors and the intertwined relationship between collaboration and experimentation

Despite the benefits of innovative behaviors for both employees and firms, there are still unanswered questions about their effects on innovation performance-oriented behaviors. From a behavioral interactionist perspective (Oldham & Cummings, 1996; Segarra-Ciprés et al., 2019; Woodman et al., 1993), employees' personal factors and organizational contexts could enhance or inhibit creativity and innovation at work. On this basis, perceived support for innovation performance-oriented behaviors depends on the institutionalization of processes such as informal and formal control to shed light on employees' innovation performance-oriented behaviors (Segarra-Ciprés et al., 2019).

Anyone can see innovation performance-oriented behaviors in an organization, especially in the implementation phase of innovative ideas. This is also the time when the correspondence or incompatibility between organizational and individual goals is more pronounced, and any incompatibilities generate behavioral resistance to change (Schalk et al., 1998).

Therefore, experimentation and collaboration-oriented behaviors are intertwined mediators between innovative ideas and innovation performance-oriented behaviors because, first, experimentation-oriented behaviors are related to sensitivity toward the uncertainties of innovative ideas. Second, the ability to identify the smallest and fastest action to promote innovation performance involves producing and extracting the desired learning through information from the experiment that is valuable for the current innovative idea or future ones. These two perspectives, the implementation of learning and the adaptation of ideas, can be interpreted as learning actions that foster more precise innovation performance-oriented behaviors, feeding new information back into new innovative ideas in a meaningful way (Hassi & Rekonen, 2018).

Additionally, some authors (Hassi & Rekonen, 2018) have explored individual characteristics that promote experimentation-oriented behaviors, pointing to thinking styles (interaction between the abstract and concrete, unbounded exploration, opportunity-focused continuous reflection), personality traits (intellectual humility, being opportunity-focused, being action-oriented, courage), and experimentation skills (sensitivity toward uncertainty, knowing how to design valuable experiments, extracting learning,

implementing learning, and adapting ideas), which are characteristics that are more efficient in collaborative contextual conditions (Segarra-Ciprés et al., 2019), where employees can enhance or inhibit their innovation performance-oriented behaviors at work (Woodman et al., 1993). Collaboration and experimentation have a bidirectional causal effect. Therefore, we hypothesize:

Hypothesis 4: There is a significant positive relationship between collaboration-oriented behavior and experimentation-oriented behavior.

Figure 1 shows the conceptual framework based on the literature reviewed in this section.

3. Method

Our empirical research investigates domains in which employees responsible for technological integration in a Brazilian e-commerce firm must, at least to some extent, engage in collaboration and experimentation-oriented behaviors with internal and external users in order to increase the expected innovation performance. We employ two criteria that are considered important to identify the relationship between our variables to confirm the hypotheses. First, we choose employees at the senior and middle management levels who are users and leaders in integrating current technologies with new ones. Second, to address domains in which technologies are often shared with other users, we analyze how innovative ideas and collaboration, and experimentation-oriented behaviors are related to innovation performance-oriented behaviors (Schweisfurth & Raasch, 2020).

3.1 Sample

From September to October 2021, the data collection was carried out in a Brazilian e-commerce firm engaged in managing internal and external knowledge to facilitate the integrability and innovation of new digital technologies in its operational processes. Although the practice of using digital technologies to conduct business was not new, it was the first time that the firm engaged in a large number of innovative projects in technology integration. Innovative ideas affect the integration of digital technologies, which is considered an innovation by senior leaders, and innovative behaviors are essential because the new technologies to be implemented had never been used before.

The company under analysis is a large one located in São Paulo, with over 1000 employees, and a market leader in full service, offering complete management for e-commerce in different segments and service models. It offers personalized management for different business models: B2C, B2B, B2E, marketplace and omnichannel. It has its own integrated structure, with an innovative vision and a focus on performance and results.

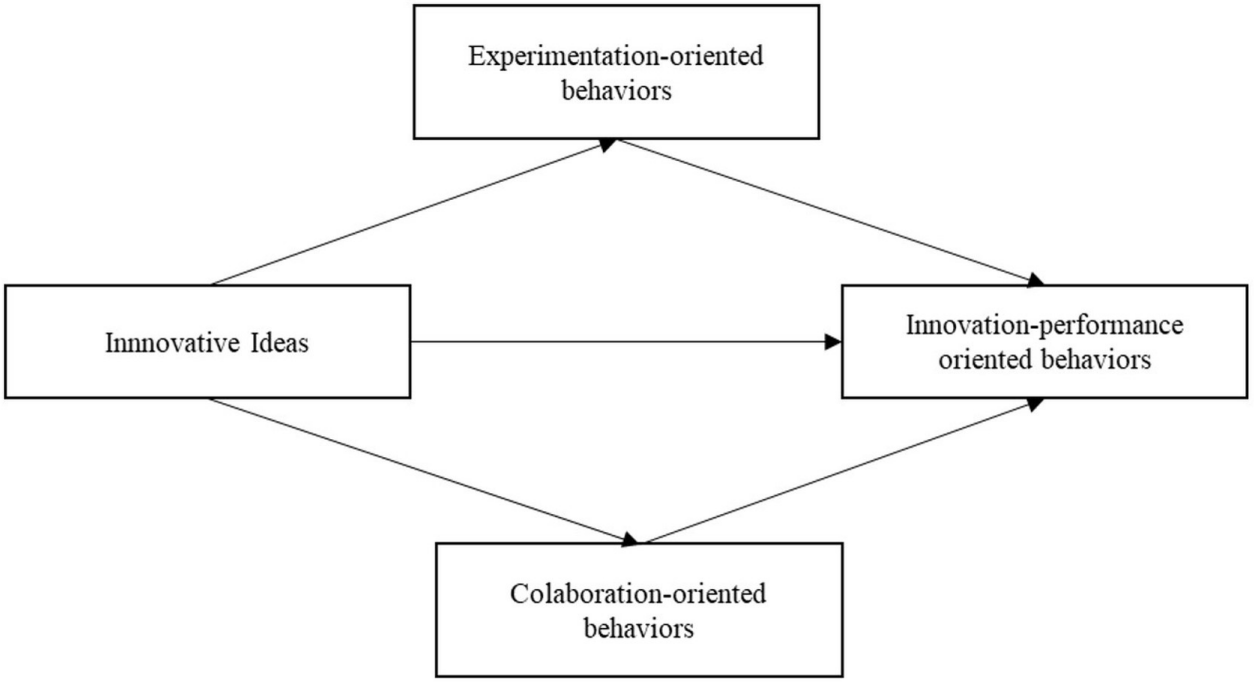

Figure 1. Conceptual framework

Therefore, senior managers responsible for project implementation were selected and invited to participate via a survey questionnaire. All questions were originally written in English and translated into Portuguese, and they came from instruments already tested in the literature (Brislin, 1986). To minimize any translation errors, a Ph.D. in English first translated all the questions into Portuguese. An advanced professional English speaker then translated the English into Portuguese. At this point, the two bilingual translators discussed the differences and made necessary changes to the Portuguese version based on the comparison of both translations with the original questions. No significant changes were made during the translations process, so the meaning of the questions remained similar to the original instruments.

During a virtual workshop on technology integration processes, 220 employees received instructions and a link to complete the online survey; only 106 validated responses were received, as part of the team preferred not to answer the survey (Supplementary Data 1 – database). Table 1 presents the descriptions of the participants.

3.2 Measures

Standard measures from previous studies were employed to quantify the variables. The scores of the variables were on a five-point Likert scale ranging from "Completely Disagree = 1" to "Completely Agree = 5." The variables were analyzed at an individual level. Innovative ideas were measured using a combination of item scales proposed by Janssen (2000) and Norouzinik et al. (2022). An example item is "I always support innovative ideas for difficult issues." The Cronbach's alpha was 0.824 for this scale. Experimentation-oriented behaviors were measured using the three-item scale proposed by Swailes (2004). An example item is "I like to experiment with different technologies and work practices." The Cronbach's alpha was 0.823 for this scale. In addition, a test questionnaire from Chiu (2018) was used for collaboration-oriented behaviors. An example item is "I mobilize support to promote innovative ideas." The Cronbach's alpha was 0.825 for this scale.

Innovation performance-oriented behaviors were measured, consisting of the generation, promotion, and implementation of innovative ideas (Janssen, 2004) and the transformation of ideas into useful applications (Norouzinik et al., 2022). An example item is "I assess the usefulness of innovative ideas before and after implementing them." The Cronbach's alpha was 0.821 for this scale. In previous studies, other researchers assessed employees' opinions on innovative supervisors' behaviors and other employees' positions, and the results were reliable in these cases (Akram et al., 2020; Janssen, 2000, 2004, 2005; Li & Hsu, 2016; Norouzinik et al., 2022; Schweisfurth & Raasch, 2020).

Table 1
Descriptive statistics regarding the participants

Age	Percentage	N
Less than 25 years old	22.64	24
26 to 35 years old	60.38	64
36 to 46 years old	16.98	18
46 to 55 years old	0.00	0
More than 55 years old	0.00	0
Time of service in current job position		
Less than 1 year	41.51	44
1 to 3 years	46.23	49
4 to 6 years	9.43	10
7 to 10 years	1.89	2
More than 11 years	0.94	1
Self-evaluation of technological knowledge		
No knowledge	0.00	0
Low level	6.60	7
Medium level	51.89	55
High level	31.13	33
Very high level	10.38	11

N = Sample Size

The measurement models and the relationships between the latent and observed variables are the prerequisite of this section by showing the results of CFA and SEM. Table 2 presents the results of the construct reliability statistics of the measures, showing the factor loadings, means, standard deviations, AVE, CR, and Cronbach's alpha for all the variables, indicating that the measurements are adequate. The mean for all variables is greater than three.

3.3 Statistical methods applied

Based on the proposed hypotheses, there is a relationship between the constructs involving independent, mediating and dependent variables. For this reason, to reduce this complexity, improve our explanation, and enhance the power of the proposed model, structural equation modeling (SEM) is adopted (Hair et al., 2009), as it is the most appropriate method to deal with formative variables. This choice was made because in order to deal with multilevel relationships between variables, it is the most appropriate method for data analysis (Hair et al., 2012). SEM is considered an extension of several multivariate techniques (multiple regression and factor analysis) to examine a number of interdependent relationships simultaneously. It can also be seen as a technique for confirming the previously developed conceptual model based on existing theory (Hair et al., 2009).

However, there are limitations to using SEM, for example, the results tend to overestimate the item loadings (lambdas [λx and λy]) and underestimate the path coefficients (betas [β] and gammas [Γ]), as well as the coefficient of determination (R^2). Using covariance matrices also has limitations; for example, the results tend to overestimate structural relationships and underestimate item loadings (lambdas), suggesting that SEM provides a test of hypothesized relationships (Ernst et al., 2010).

Previous studies suggest that the weaknesses of the SEM method are the strengths of covariance matrices and vice versa (Hair et al., 2012). Given the nature of our data (non-standard), SEM is adopted because it is already widely accepted and used in studies published in academic business journals (Akram et al., 2020; Bolander et al., 2015; Norouzinik et al., 2022) and innovation management (Cautela et al., 2021; Klein et al., 2021).

Amos SPSS 26 software was used to test the measurement and path models (Supplementary Data 2 – SPSS output). Bias-corrected bootstrapping with 5000 samples at a 95% confidence level was also run to test the hypothesis and the structural model. According to some authors (Cheung & Lau, 2008; Kashif et al., 2023), bias-corrected bootstrapping is a robust method for testing mediation in SEM.

Table 2
Construct reliability statistics

Item	Questionnaire	Cronbach's α	Mean	SD	AVE	Composite Reliability
	Innovative Ideas (Janssen, 2000; Norouzinik et al., 2022)					
II1	I always support innovative ideas for difficult issues.	.824	4.264	.820	.676	.862
II2	I research new working methods, techniques, or instruments.	.825	4.009	.878		
II3	I work hard to get key members of the organization excited about innovative ideas.	.817	3.840	.958		
	Experimentation-oriented behaviors (Swailes, 2004)					
EOB1	I challenge the way of doing things.	.833	3.802	.888	.681	.865
EOB2	I suggest efficiency and quality improvements.	.819	4.368	.785		
EOB3	I like to experiment with different technologies and work practices.	.823	4.377	.710		
	Collaboration-oriented behaviors (Chiu, 2018)					
COB1	I mobilize support to promote innovative ideas.	.825	4.151	.814	.676	.862
COB2	I make improvements for the use of modern technologies (creation of manuals, newsletters, and documents).	.829	4.047	1.055		
COB3	I use facts and logic to convince my colleagues on how to use the latest technologies that can improve our professional lives.	.812	4.189	.896		
	Innovation performance-oriented behaviors (Janssen, 2000**;** Norouzinik et al., 2022)					
IPOB1	I turn innovative ideas into useful applications or activities.	.812	3.821	.882	.706	.878
IPOB2	I introduce innovative ideas into the workplace in a systematic way.	.817	3.491	.908		
IPOB3	I assess the usefulness of innovative ideas before and after implementing them.	.821	4.113	.820		

SD = Standard Deviation; AVE = Average Variance Extracted

Internal consistency is assessed by examining the Cronbach's alpha and the composite reliability score, with values greater than 0.70 indicating strong internal consistency (Streiner, 2003). Convergent and discriminant validity through confirmatory factor analysis (CFA) supports the AVE examination and correlations between the constructs.

The Harman single-factor test avoids a common error bias in the JASP 0.15 software (Supplementary Data 3 – JASP output). It consists of performing an important non-rotating component of factor analysis in which a single dimension groups all indicators. The literature indicates that the Harman single-factor test (Aguirre-Urreta & Hu, 2019) is the most commonly used to verify common method variance (Podsakoff et al., 2003), probably because of the simplicity of its operation. According to this method, the common method variance is not significant if the total variance explained by the single unrotated factor is less than 50% of the total variance of the scale.

In addition, all the other extracted factors accounted for approximately 64.1% of the total variance. Hence, the collected data were unbiased, and the explained variance was not diverted. There are no particular concerns about the data. The results of the validity test, reliability test, and hypothesis testing are presented in the results section.

The protocol of procedures adopted to fit the model followed the proposed sequence (Ringle et al., 2020), namely observation of (a) factor loadings; (b) multicollinearity; (c) internal consistency (Cronbach's alpha) and composite reliability (CR); (d) convergent validity [average variance extracted (AVE)]; (e) discriminant validity [Fornell & Larcker (1981) criterion]; (e) Pearson's coefficients of determination (R^2); and (f) values and significance of path coefficients.

4 Findings

Table 3 shows the correlation matrix for the research variables, including innovative ideas (IIs), collaboration-oriented behaviors (COBs), experimentation-oriented behaviors (EOBs), and innovation performance-oriented behaviors (IPOBs) in each of the constructs. There were significant correlations between the independent and dependent variables and the mediators, except for COB1 and COB2, which were related to IPOB3 and were not significant.

Table 4 presents the CFA results for all the variables, and the goodness-of-fit index (GFI) was 0.761 ($p > 0.001$), confirming the appropriateness of the model.

Table 3
Correlations between variables

Variables	Mean	SD	Innovative Ideas	Experimentation-oriented Behaviors	Collaboration-oriented Behaviors
Innovative Ideas	4.04	.627	1		
Experimentation-oriented Behaviors	4.18	.596	.411	1	
Collaboration-oriented Behaviors	4.13	.662	.664	.473	1
Innovation Performance-oriented Behaviors	3.81	.691	.616	.455	.491

N = 106. All correlations at p > .001. SD = Standard Deviation

Table 4
Confirmatory factor analysis results

Factor	Indicator	Std. Est.	Std. Error	z value	p	95% Confidence Interval	
						Lower	Upper
Innovative ideas	II1	.587	.146	3.272	.001	.192	.766
	II2	.467	.115	3.536	***	.182	.635
	II3	.465	.162	2.741	.006	.126	.759
Experimentation-oriented behaviors	EOB1	.444	.102	3.838	***	.192	.594
	EOB 3	.507	.093	3.848	***	.176	.541
	EOB 2	.852	.122	5.455	***	.427	.905
Collaboration-oriented behaviors	COB2	.714	.223	3.362	***	.313	1.187
	COB3	.354	.120	2.622	.009	.080	.551
	COB1	.516	.126	3.331	***	.172	.664
Innovation-performance oriented behaviors	IPOB1	.762	.087	7.721	***	.499	.838
	IPOB2	.693	.095	6.566	***	.439	.813
	IPOB3	.556	.095	4.754	***	.267	.641

*** = p > .001

Three different SEMs were used to evaluate the hypotheses (Figure 2). The first model, called the innovative ideas model, tested the direct effect of innovative ideas on innovation performance-oriented behaviors and the mediating roles of collaboration and experimentation-oriented behaviors on innovation performance-oriented behaviors to confirm hypotheses 1, 2 and 3. Considering the limitations of the statistical tool to measure the bidirectional effects to test Hypothesis 4, two additional models were created. The second model, called the collaboration model, was used to test the mediation effect of collaboration-oriented behaviors on innovation performance-oriented behaviors when influenced by experimentation-oriented behaviors. The third model, called the experimentation model, analyzed the mediation effect of experimentation-oriented behaviors on innovation performance-oriented behaviors when influenced by collaboration-oriented behaviors. Both were intended to confirm Hypothesis 4.

Figure 2 depicts that, in the three models, collaboration-oriented behaviors as mediators increase the impact of innovative ideas on innovation performance-oriented behaviors, which corroborates the studies of Ruijter et al. (2021), who study collaboration and trust in megaproject practices, and Ben Jouida et al. (2021), who mention that the collaboration conditions for a given firm are analytically derived according to the sharing method and behaviors considered and used to enhance the innovative solution approach. Other authors (Chen et al., 2021) also highlighted, through latent profile analysis, four collaboration profiles, including the restricted collaboration profile, the smarmy collaboration profile, the intuitive collaboration profile, and the modest collaboration profile, as a behavior-oriented strategy for innovation. However, our finding does not confirm Pastra et al. (2021), who mentioned that collaborative behavior did not predict any dimension of performance at the board level.

Experimentation-oriented behaviors do not significantly affect collaboration-oriented behaviors or innovation performance-oriented behaviors in any of the three models, confirming Arribas et al. (2012), who mention that there is empirical evidence that experimentation behaviors (characterized by detecting an opportunity and accepting its risk) reduce the incentive for social behaviors where collaboration is highly important.

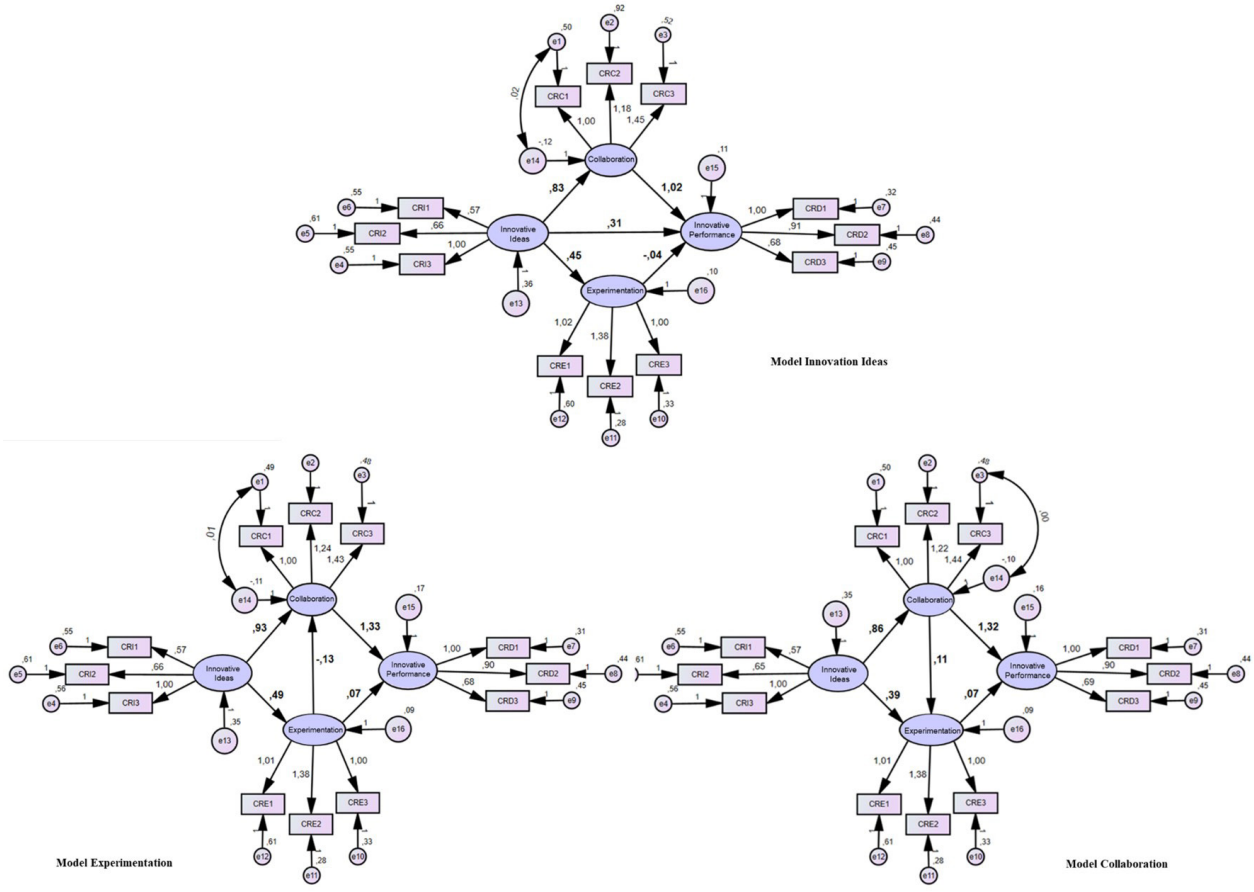

Figure 2. The three structural and estimation models

However, this effect does not appear when only self-perceptions are used instead of experimental behaviors. In an attempt to understand some nuances of experimentation behaviors, Lee et al. (2004) suggested that experimentation behavior requires examining the effects of multiple organizational conditions in combination (Lee et al., 2004).

The first direct effects model showed that innovative ideas have no effect on innovation performance-oriented behaviors (β = 0.314, p = 0.221), which does not support Hypothesis 1. It also has positive effects on collaboration-oriented behaviors (β = 0.832, p < 0.001) and experimentation-oriented behaviors (β = 0.453, p < 0.001). This means that innovative ideas alone are not enough to foster innovation performance-oriented behaviors, but they are relevant to motivating collaboration and experimentation experiences. Collaboration-oriented behaviors, as mediators, increase the impact of innovative ideas on innovation performance-oriented behaviors (β = 1.022, p = 0.007), confirming Hypothesis 2. On the other hand, experimentation-oriented behaviors as mediators have a negative impact on innovation performance-oriented behaviors (β = -0.043, p = 0.900), but not significantly, thus not confirming Hypothesis 3. This finding reveals the powerful contribution of collaboration-oriented behaviors to innovative performance behaviors, which is consistent with many authors in the literature (Chen et al., 2021; Fan et al., 2020; Hartley et al., 2013; Liu et al., 2017) who mention that collaboration is positively associated with innovation practices.

In the experimentation model, innovative ideas have positive effects on collaboration-oriented behaviors (β = 0.962, p < 0.0131) and experimentation-oriented behaviors (β = 0.486, p = 0.002). However, experimentation-oriented behaviors have no effect on collaboration-oriented behaviors (β = -0.135, p = 0.730), nor are they a mediator of innovation performance-oriented behaviors (β = 0.071, p = 0.843). However, when influenced by experimentation-oriented behaviors, collaboration-oriented behaviors have a significant positive impact on innovation performance-oriented behaviors (β = 1.328, p > 0.001).

In the collaboration model, innovative ideas have a positive effect on collaboration-oriented behaviors (β = 0.861, p < 0.001) and experimentation-oriented behaviors (β = 0.386, p = 0.027). Collaboration-oriented behaviors have no effect on experimentation-oriented behaviors (β = 0.113, p = 0.674). However, collaboration-oriented behaviors as a mediator increase the impact of innovative ideas on innovative performance-oriented behaviors (β = 1.321, p < 0.001). Furthermore, experimentation-oriented behaviors as a mediator have no effect on innovation performance-oriented behaviors, even when influenced by collaboration-oriented behaviors (β = 0.070, p = 0.844). These findings do not confirm Hypothesis 4. Table 5 shows the summary of the results of the three fitted models with all direct and mediation effects of the variables.

Table 6 presents the goodness-of-fit results for the three SEMs. Three different types of goodness-of-fit indices are verified. The first model has absolute indices, including x^2/df (1.523) and RMSEA (0.071). Wheaton et al. (1977) suggested that normalized chi-squared values lower than five would be adequate. The root-mean-square error of approximation measure also indicated that the model had a satisfactory goodness-of-fit (Hair et al., 2012). The second and third models contain equal relative indices such as the comparative fit index (CFI = 0.915), the normalized fit index (NFI = 0.802), and the incremental fit index (IFI = 0.920). Hu and Bentler (1999) suggested that CFI, NFI, and IFI scores above 0.90 were satisfactory.

Table 5
Structural estimates of the structural model

Summary of Models			Direct Effect			Mediation Effect of Experimentation			Mediation Effect of Collaboration		
			Est	Std. Est	p value	Est	Std. Est	p value	Est	Std. Est	p value
Collaboration	←	Innovative Ideas	.832	1.392	***	.926	1.409	.013	.861	1.293	***
Experimentation	←	Innovative Ideas	.453	.655	***	.486	.690	.002	.386	.550	.027
Innovation-performance	←	Collaboration	1.022	1.000	.007	1.328	1.000	***	1.321	.771	***
Innovation-performance	←	Experimentation	- .043	- .026	.900	.071	.044	.843	.070	.043	.844
Innovation-performance	←	Innovative Ideas	.314	.279	.221						
Collaboration	←	Experimentation				- .135	- .144	.730			
Experimentation	←	Collaboration							.113	.108	.674

*** p < .001

Table 6
The model fit results

Models	df	χ 2	χ2/df	NFI	IFI	CFI	RMR	PNFI	PGFI	RMSEA	p value
Innovative Ideas	48	73.088	1.523	.805	.923	.919	.053	.586	.550	.071	.011
Experimentation	48	74.122	1.544	.802	.920	.915	.053	.584	.550	.072	.009
Collaboration	48	74.173	1.545	.802	.920	.915	.053	.583	.550	.072	.009

df = degree of freedom; NFI = Normed Fit Index; IFI = Incremental Fit Index; CFI = Comparative Fit Index; RMR = Root Mean Square Residual; PNFI = Parsimony-Adjusted Measures Index; PGFI = Parsimony Goodness of Fit Index; RMSEA = Root Mean Square Error of Approximation

The parsimony indices included the normalized parsimony fit index (PNFI = 0.583 for the collaboration model and PNFI = 0.584 for the experimentation model). The parsimony goodness-of-fit index (PGFI = 0.550) was greater than 0.50, indicating a satisfactory model fit. The following goodness-of-fit indices confirmed the overall validity of the fitted models.

5 Discussion

This study analyzed innovative behaviors and their direct and mediating relationships. According to the results of the hypothesis testing, innovative ideas have a positive direct but not significant impact on innovation performance-oriented behaviors, partially confirming Hypothesis 1. Therefore, innovative ideas depend on other behaviors, such as collaboration-oriented behaviors, to become more effective, confirming Hypothesis 2. The results of testing experimentation-oriented behaviors as mediators show a negative impact on innovation performance-oriented behaviors, which does not confirm Hypothesis 3.

These relationships can be explained because even experimentation-oriented behaviors are crucial for innovation (Hassi & Rekonen, 2018; Lee et al., 2004); they are more related to failure avoidance, which directly affects employees' psychological safety (Edmondson, 2003), and their gaps in expertise, skills, or knowledge involved in the implementation of innovative ideas (Lee, 1997), and are less associated with innovation performance-oriented behaviors, which depend on institutionalized innovation processes to shed light on the innovative behaviors related to innovation performance (Segarra-Ciprés et al., 2019).

On the other hand, collaboration-oriented behaviors are more related to the predisposition and proactiveness of each employee, contributing differently according to the organizational context, regardless of the acceptance of the risk of innovative ideas, job position, or education level facilitating innovation performance-oriented behaviors (Labitzke et al., 2014; Segarra-Ciprés et al., 2019). This means that collaboration behaviors are more perceived in the idea promotion stage, where efforts are made to remove organizational resistance and barriers to bring change (Akram et al., 2020; Shane, 1994), which may improve innovation performance-oriented behaviors.

To understand the relevance of collaboration and experimentation-oriented behaviors at the organizational level due to firms' capacity to solve innovation problems at a fast and dynamic pace and scale, the fourth and fifth hypotheses investigated the relationship of these two behaviors on innovation performance-oriented behaviors. The results show that experimentation-oriented behaviors are not positively associated with collaboration, not confirming Hypothesis 4. However, collaboration-oriented behaviors are positively associated with experimentation, but are not statistically significant, partially confirming Hypothesis 5.

These results may be explained by the effects of multiple organizational conditions in combination (Lee et al., 2004), beyond employees' thinking styles, personality traits, and skills (Hassi & Rekonen, 2018), which may enhance or inhibit their innovative ability to perform well at work (Woodman et al., 1993). This means that experimentation or collaboration-oriented behaviors are fully related to organizational contexts and psychological aspects, and their positive association will also depend on these two aspects. In other words, when the correspondence or incompatibility between organizational and individual innovation goals are more prominent and any incompatibilities generate behavioral resistance to change or innovation (Schalk et al., 1998), neither collaboration nor experimentation will affect each other because of contextual and psychological aspects.

Therefore, based on the results, it can be said that the more measures that are taken to create a fit between collaboration, communication, skills development, and an open thinking style that strengthen the level of relational capacity in employees, the more they will

be motivated to have behaviors oriented to innovative ideas and performance, confirming the results of Norouzinik et al. (2022). In addition, this study highlights that experimentation-oriented behaviors are not always reflected in behaviors for better performance in innovation, as they can be used as a protective tool among employees to hide their weaknesses in mental resilience, action orientation, sensitivity toward uncertainties, learning extraction, learning implementation, and idea adaptation during the innovation process (Hassi & Rekonen, 2018).

In summary, our findings are also in line with many other innovation researchers (Andersen et al., 2022; Camisón & Puig-Denia, 2016; Damanpour, 2014; Fan et al., 2020; Segarra-Ciprés et al., 2019) who assumed that firms, as adaptive systems, intend to ensure behaviors of collaboration and experimentation to adopt innovations and enable effective changes. In addition to these arguments, we highlighted what Montenegro et al. (2021) pointed out as essential when considering that "[...] innovation can be thought of mainly based on what is new for a given environment, organization, or context. Thus, an action can be a pioneer in an environment and already be fully consolidated in a different context" (Montenegro et al., 2021, p. 763).

5.1 Theoretical implications

This study supports innovation and behavioral literature. First, based on the interactionist perspective (Segarra-Ciprés et al., 2019), the results showed how employees' innovative behaviors, their interactions, and their characteristics could increase their effectiveness in innovation performance. In fact, employees present innovative ideas based on their behavioral relationships. When an employee pursues an innovative idea, he or she must also interact with other employees in a collaborative manner to feel confident that any experimentation or testing support or development will receive attention from the organization when needed.

Therefore, according to the interactionist perspective, behaviors complement each other in an association of trust, relational capacity, and openness to organizational contexts to promote any innovative ideas and foster innovation performance. From this perspective, the study answered the research question of how the effects of innovative behaviors are related to a dynamic environment, highlighting the critical role of relational capacity and personality traits in collaboration and experimentation-oriented behaviors (Ang et al., 2015; Blayone et al., 2020; Hassi & Rekonen, 2018; Thomas et al., 2018).

Another theoretical contribution derived from the result that there was no effect of experimentation-oriented behavior on innovation performance may be the indication of the need to discuss this topic more effectively in the field of innovation management, based on contributions from the information systems research field and strategic people management. Additionally, this behavioral evidence is also relevant to create future institutions, relationships, systems, and processes that are different from those of the past, providing more awareness about the impact of experimentation-oriented behaviors on business management.

5.2 Practical implications

The findings provide suggestions for practical implementation. First, developing and establishing an atmosphere of collaboration to innovate requires proper alignment and integration to manage contradictions and exercise intellectual humility in dealing with challenges. In addition, leaders need to attribute success to external factors and take responsibility for undesirable or unpredictable situations. Hence, it is essential to work on improving behavioral characteristics and perspectives through self-awareness of personal values and personality traits in order to mitigate negative behaviors associated with the risks inherent in innovative ideas. This answers the question of what behaviors and skills firms and leaders of the future will need to manage ongoing transitions if they want to innovate.

Second, although a variety of basic and advanced technical skills remain essential for innovation, firms that are highly dependent on technology should be aware of technology enthusiasm and learning interest as key behaviors that support the continuous professional development requirements of dynamic, digitized work (Blayone et al., 2020). Cultural and diversity orientations emerge as relevant socio-psychological forces (alongside employee personality traits and behaviors) that also shape organizational dynamics (Thomas et al., 2018). And innovation performance-oriented behaviors should combine technological and relational processes to interact with contexts and dispositions in more predictable ways (Ang et al., 2015; Blayone et al., 2020).

Finally, managers can use these results as a source of inspiration to promote corporate environments with greater experimentation and collaboration initiatives, in order to increase the participatory strength of teams in innovation projects, to promote not only ideas, but also the cultural and diversity orientation mentioned above, through a technological approach not yet discussed by the organization.

6 Conclusion and limitations

This study sought to understand, from an interactionist perspective, the innovative behaviors required in a digital transformation environment of a Brazilian e-commerce firm. This scenario allowed us to identify behavioral characteristics considered highly associated with innovation in the emerging dynamics of digitized work. From this perspective, the behavioral literature related to innovation offered a detailed vision of an aggregated new behavioral dynamic to rethink relationships among innovative behaviors in how firms, managers, and stakeholders can develop and enhance these innovative behaviors to anticipate and respond agilely to new challenges related to innovation performance.

As mentioned earlier, previous studies have looked at individual perspectives as affecting innovative behaviors, and in other studies have looked at organizational contexts. In both cases, the results were consistent. Employees' self-assessment of their innovative behaviors is a limitation of the present study. In addition, since the statistical sample included managers involved in the implementation of technological projects in private e-commerce firms in the Southwest of Brazil, it may not be possible to generalize the results to the industrial and public sectors. Due to the statistical sample size and the difficulty of collecting information longitudinally at various stages, cross-sectional research is another limitation of the study. Therefore, it is important to study the relationships between the research variables longitudinally and at different times in future research. In addition, there may be an inverse relationship between variables, which can be considered as a suggestion for future research.

Among the limitations of this study, there is also the non-investigation of qualitative aspects related to the perception of behavioral processes and controls associated with innovation performance. In addition, there was the difficulty of access to outsourced workers for data collection. Therefore, we suggest, for future research, a qualitative approach to such phenomena in other industries, as well as in different sized companies, with the scale used, aiming to make comparisons between organizations with different characteristics, as well as to deepen the behavioral aspects regarding innovation performance.

Finally, this study provided useful information about the behavioral factors that can foster technology implementation performance within organizations and how to address the behavioral aspects of employees in order for them to work closely together in the future.

REFERENCES

ABSTEIN, A., & SPIETH, P. (2014). Exploring HRM meta-features that foster employees' innovative work behaviour in times of increasing work-life conflict: Innovative work behaviour and work-life conflict. *Creativity and Innovation Management*, *23*(2), 211-225. http://dx.doi.org/10.1111/caim.12053.

AGUIRRE-URRETA, M. I., & HU, J. (2019). Detecting common method bias: Performance of the Harman's Single-Factor Test. *ACM SIGMIS Database*, *50*(2), 45-70. http://dx.doi.org/10.1145/3330472.3330477.

AKRAM, T., LEI, S., HAIDER, M. J., & HUSSAIN, S. T. (2020). The impact of organizational justice on employee innovative work behavior: Mediating role of knowledge sharing. *Journal of Innovation & Knowledge*, *5*(2), 117-129. http://dx.doi.org/10.1016/j.jik.2019.10.001.

AL-GHAZALI, B. M. (2023). Understanding employees' innovative work behavior through interactionist perspective: The effects of working style, supportive noncontrolling supervision and job complexity. *European Journal of Innovation Management*, *26*(1), 230-255. http://dx.doi.org/10.1108/EJIM-03-2021-0165.

AL-HAWARI, M. A., BANI-MELHEM, S., & MOHD. SHAMSUDIN, F. (2021). Does employee willingness to take risks affect customer loyalty? A moderated mediation examination of innovative behaviors and decentralization. *International Journal of Contemporary Hospitality Management*, *33*(5), 1746-1767. http://dx.doi.org/10.1108/IJCHM-08-2020-0802.

ALLEN, T. J. (1984). *Managing the flow of technology*. MIT Press. https://books.google.com.br/books?id=LLdNEAAAQBAJ

ANDERSEN, T. C. K., AAGAARD, A., & MAGNUSSON, M. (2022). Exploring business model innovation in SMEs in a digital context: Organizing search behaviours, experimentation and decision- making. *Creativity and Innovation Management*, *31*(1), 19-34. http://dx.doi.org/10.1111/caim.12474.

ANG, S., VAN DYNE, L., & ROCKSTUHL, T. (2015). Cultural intelligence. In M. J. Gelfand, C. Chiu, & Y. Hong (Orgs.), *Handbook of advances in culture and psychology* (Vol. 5, pp. 273–324). Oxford University Press. http://dx.doi.org/10.1093/acprof:oso/9780190218966.003.0006

ARRIBAS, I., HERNÁNDEZ, P., URBANO, A., & VILA, J. E. (2012). Are social and entrepreneurial attitudes compatible?: A behavioral and self- perceptional analysis. *Management Decision*, *50*(10), 1739-1757. http://dx.doi.org/10.1108/00251741211279576.

ARSHAD, M., FAROOQ, M., AFZAL, S., & FAROOQ, O. (2020). Adoption of information systems in organizations: Understanding the role of institutional pressures in a collectivist culture. *Journal of Enterprise Information Management*, *33*(2), 265-284. http://dx.doi.org/10.1108/JEIM-05-2019-0130.

BEN JOUIDA, S., GUAJARDO, M., KLIBI, W., & KRICHEN, S. (2021). Profit maximizing coalitions with shared capacities in distribution networks. *European Journal of Operational Research*, *288*(2), 480-495. http://dx.doi.org/10.1016/j.ejor.2020.06.005.

BENÍTEZ-ÁVILA, C., HARTMANN, A., DEWULF, G., & HENSELER, J. (2018). Interplay of relational and contractual governance in public-private partnerships: The mediating role of relational norms, trust and partners' contribution. *International Journal of Project Management*, *36*(3), 429-443. http://dx.doi.org/10.1016/j.ijproman.2017.12.005.

BLAYONE, T. J. B., MYKHAILENKO, O., USCA, S., ABUZE, A., ROMANETS, I., & OLEKSIIV, M. (2020). Exploring technology attitudes and personal–cultural orientations as student readiness factors for digitalised work. *Higher Education, Skills and Work-based Learning*, *11*(3), 649-671. http://dx.doi.org/10.1108/HESWBL-03-2020-0041.

BOLANDER, W., SATORNINO, C. B., HUGHES, D. E., & FERRIS, G. R. (2015). Social networks within sales organizations: Their development and importance for salesperson performance. *Journal of Marketing*, *79*(6), 1-16. http://dx.doi.org/10.1509/jm.14.0444.

BOLINO, M., VALCEA, S., & HARVEY, J. (2010). Employee, manage thyself: The potentially negative implications of expecting employees to behave proactively. *Journal of Occupational and Organizational Psychology*, *83*(2), 325-345. http://dx.doi.org/10.1348/096317910X493134.

BRISLIN, R. W. (1986). The wording and translation of research instruments. In W. J. Lonner & J. W. Berry (Eds.), *Field methods in cross-cultural research* (pp. 137–164). Sage Publications, Inc.

CAMISÓN, C., & PUIG-DENIA, A. (2016). Are quality management practices enough to improve process innovation? *International Journal of Production Research*, *54*(10), 2875-2894. http://dx.doi.org/10.1080/00207543.2015.1113326.

CANNON, M. D., & EDMONDSON, A. C. (2005). Failing to Learn and Learning to Fail (Intelligently). *Long Range Planning*, *38*(3), 299-319. http://dx.doi.org/10.1016/j.lrp.2005.04.005.

CAUTELA, C., SIMONI, M., & MORAN, P. (2021). Microfoundations of dynamic design capabilities: An empirical analysis of "excellent" Italian design firms. *Journal of Product Innovation Management*, *39*(1), 3-23. http://dx.doi.org/10.1111/jpim.12592.

CHEN, G., CHEN, J., TANG, Y., NING, Y., & LI, Q. (2021). Collaboration strategy selection in BIM-enabled construction projects: A perspective through typical collaboration profiles. *Engineering, Construction and Architectural Management*, *29*(7), 2689-2713. http://dx.doi.org/10.1108/ECAM-01-2021-0004.

CHEN, T., LI, F., & LEUNG, K. (2016). When does supervisor support encourage innovative behavior? Opposite moderating effects of general self-efficacy and internal locus of control: Supervisor support and innovative behaviour. *Personnel Psychology*, *69*(1), 123-158. http://dx.doi.org/10.1111/peps.12104.

CHEUNG, G. W., & LAU, R. S. (2008). Testing Mediation and Suppression Effects of Latent Variables: Bootstrapping With Structural Equation Models. *Organizational Research Methods*, *11*(2), 296-325. http://dx.doi.org/10.1177/1094428107300343.

CHIU, H. H. (2018). Employees' intrinsic and extrinsic motivations in innovation implementation: The moderation role of Managers' Persuasive and Assertive Strategies. *Journal of Change Management*, *18*(3), 218-239. http://dx.doi.org/10.1080/14697017.2017.1407353.

CIBORRA, C. U. (2009). The platform organization: recombining strategies, structures, and surprises. In: C. Avgerou, G. F. Lanzara, & L. P. Willcocks. *Bricolage, care and information* (pp. 134-158). Palgrave Macmillan. http://dx.doi.org/10.1057/9780230250611_7

DAMANPOUR, F. (2014). Footnotes to research on management innovation. *Organization Studies*, *35*(9), 1265-1285. http://dx.doi.org/10.1177/0170840614539312.

DE JONG, J. P. J., & DEN HARTOG, D. N. (2007). How leaders influence employees' innovative behaviour. *European Journal of Innovation Management*, *10*(1), 41-64. http://dx.doi.org/10.1108/14601060710720546.

DORENBOSCH, L., VAN ENGEN, M. L., & VERHAGEN, M. (2005). On-the-job Innovation: The Impact of Job Design and Human Resource Management through Production Ownership. *Creativity and Innovation Management*, *14*(2), 129-141. http://dx.doi.org/10.1111/j.1476-8691.2005.00333.x.

DWECK, C. S., & LEGGETT, E. L. (2000). *A social-cognitive approach to motivation and personality.* Psychology Press.

EDMONDSON, A. C. (2003). Speaking up in the operating room: How team leaders promote learning in interdisciplinary action teams. *Journal of Management Studies*, *40*(6), 1419-1452. http://dx.doi.org/10.1111/1467-6486.00386.

ERNST, H., HOYER, W. D., & RÜBSAAMEN, C. (2010). Sales, marketing, and research-and-development cooperation across new product development stages: Implications for success. *Journal of Marketing*, *74*(5), 80-92. http://dx.doi.org/10.1509/jmkg.74.5.080.

FAN, F., LIAN, H., & WANG, S. (2020). Can regional collaborative innovation improve innovation efficiency? An empirical study of Chinese cities. *Growth and Change*, *51*(1), 440-463. http://dx.doi.org/10.1111/grow.12346.

FLEESON, W., & NOFTLE, E. E. (2009). In favor of the synthetic resolution to the person–situation debate. *Journal of Research in Personality*, *43*(2), 150-154. http://dx.doi.org/10.1016/j.jrp.2009.02.008.

FORNELL, C., & LARCKER, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39-50. https://doi.org/10.2307/3151312.

GRIFFIN, M. A., NEAL, A., & PARKER, S. K. (2007). A new model of work role performance: Positive behavior in uncertain and interdependent contexts. *Academy of Management Journal*, *50*(2), 327-347. http://dx.doi.org/10.5465/amj.2007.24634438.

HAIR, J. F., BLACK, W. C., BABIN, B. J., ANDERSON, R. E., & TATHAM, R. L. (2009). *Análise multivariada de dados* (6. ed). Bookman. https://books.google.com/books?id=oFQs_zJI2GwC

HAIR, J. F., SARSTEDT, M., RINGLE, C. M., & MENA, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, *40*(3), 414-433. http://dx.doi.org/10.1007/s11747-011-0261-6.

HARTLEY, J., SØRENSEN, E., & TORFING, J. (2013). Collaborative innovation: A viable alternative to market competition and organizational entrepreneurship. *Public Administration Review*, *73*(6), 821-830. http://dx.doi.org/10.1111/puar.12136.

HASSI, L., & REKONEN, S. (2018). How individual characteristics promote experimentation in innovation. *International Journal of Innovation Management*, *22*(04), 1850038. http://dx.doi.org/10.1142/S136391961850038X.

HU, L., & BENTLER, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1-55. http://dx.doi.org/10.1080/10705519909540118.

JANSSEN, O. (2000). Job demands, perceptions of effort-reward fairness and innovative work behaviour. *Journal of Occupational and Organizational Psychology*, *73*(3), 287-302. http://dx.doi.org/10.1348/096317900167038.

JANSSEN, O. (2004). How fairness perceptions make innovative behavior more or less stressful. *Journal of Organizational Behavior*, *25*(2), 201-215. http://dx.doi.org/10.1002/job.238.

JANSSEN, O. (2005). The joint impact of perceived influence and supervisor supportiveness on employee innovative behaviour. *Journal of Occupational and Organizational Psychology*, *78*(4), 573-579. http://dx.doi.org/10.1348/096317905X25823.

KASHIF, M., NAHEED, R., & WIJENAYAKE, S. (2023). Rethinking abusive supervision: Antecedents and reparative mechanisms of abusive supervision, including supervisor frustration, coworker support, guilt, and supervisor OCB in a mediated-moderation model. *Revista Brasileira de Gestão de Negócios*, *25*(1), 108-131. http://dx.doi.org/10.7819/rbgn.v25i1.4217.

KLEIN, S. P., SPIETH, P., & HEIDENREICH, S. (2021). Facilitating business model innovation: The influence of sustainability and the mediating role of strategic orientations. *Journal of Product Innovation Management*, *38*(2), 271-288. http://dx.doi.org/10.1111/jpim.12563.

KLEYSEN, R. F., & STREET, C. T. (2001). Toward a multi- dimensional measure of individual innovative behavior. *Journal of Intellectual Capital*, *2*(3), 284-296. http://dx.doi.org/10.1108/EUM0000000005660.

KRAUS, S., RIGTERING, J. P. C., HUGHES, M., & HOSMAN, V. (2012). Entrepreneurial orientation and the business performance of SMEs: A quantitative study from the Netherlands. *Review of Managerial Science*, *6*(2), 161-182. http://dx.doi.org/10.1007/s11846-011-0062-9.

KRISTIANSEN, M., & BLOCH-POULSEN, J. (2010). Employee Driven Innovation in Team (EDIT) – Innovative Potential, Dialogue, and Dissensus. *International Journal of Action Research*, *6*(2–3), 155-195.

LABITZKE, G., SVOBODA, S., & SCHULTZ, C. (2014). The role of dedicated innovation functions for innovation process control and performance - An empirical study among hospitals: Role of dedicated innovation functions. *Creativity and Innovation Management*, *23*(3), 235-251. http://dx.doi.org/10.1111/caim.12068.

LATUSEK, D., & VLAAR, P. W. L. (2018). Uncertainty in interorganizational collaboration and the dynamics of trust: A qualitative study. *European Management Journal*, *36*(1), 12-27. http://dx.doi.org/10.1016/j.emj.2017.10.003.

LEE, F. (1997). When the going gets tough, do the tough ask for help? Help seeking and power motivation in organizations. *Organizational Behavior and Human Decision Processes*, *72*(3), 336-363. http://dx.doi.org/10.1006/obhd.1997.2746. PMid:9606170.

LEE, F., EDMONDSON, A. C., THOMKE, S., & WORLINE, M. (2004). The mixed effects of inconsistency on experimentation in organizations. *Organization Science*, *15*(3), 310-326. http://dx.doi.org/10.1287/orsc.1040.0076.

LI, M., & HSU, C. H. C. (2016). Linking customer-employee exchange and employee innovative behavior. *International Journal of Hospitality Management*, *56*, 87-97. http://dx.doi.org/10.1016/j.ijhm.2016.04.015.

LICHTENTHALER, U. (2020). Extremes of acceptance: Employee attitudes toward artificial intelligence. *The Journal of Business Strategy*, *41*(5), 39-45. http://dx.doi.org/10.1108/JBS-12-2018-0204.

LIU, D., CHEN, X.-P., & YAO, X. (2011). From autonomy to creativity: A multilevel investigation of the mediating role of harmonious passion. *The Journal of Applied Psychology*, *96*(2), 294-309. http://dx.doi.org/10.1037/a0021294. PMid:21058804.

LIU, M., HULL, C. E., & HUNG, Y.-T. C. (2017). Starting open source collaborative innovation: The antecedents of network formation in community source: Antecedents of community source networks. *Information Systems Journal*, *27*(5), 643-670. http://dx.doi.org/10.1111/isj.12113.

MADJAR, N., OLDHAM, G. R., & PRATT, M. G. (2002). There's No Place Like Home? The contributions of Work and Nonwork creativity support to employees' creative performance. *Academy of Management Journal*, *45*(4), 757-767. http://dx.doi.org/10.2307/3069309.

MONTENEGRO, A. D. V., PINHO, A. P. M., TUPINAMBÁ, A. C. R., & FEITOSA, R. L. (2021). É possível encontrar inovação gerencial e práticas de gestão de pessoas voltadas à inovação em universidades federais?. *Cadernos EBAPE.BR*, *19*(spe), 761-776. https://doi.org/10.1590/1679-395120200224.

MUSSNER, T., STROBL, A., VEIDER, V., & MATZLER, K. (2017). The effect of work ethic on employees' individual innovation behavior. *Creativity and Innovation Management*, *26*(4), 391-406. http://dx.doi.org/10.1111/caim.12243.

NATALICCHIO, A., MESSENI PETRUZZELLI, A., & GARAVELLI, A. C. (2017). Innovation problems and search for solutions in crowdsourcing platforms – A simulation approach. *Technovation*, *64–65*, 28-42. http://dx.doi.org/10.1016/j.technovation.2017.05.002.

NISULA, A.-M., & KIANTO, A. (2016). The antecedents of individual innovative behaviour in temporary group innovation: antecedents of individual innovative behaviour. *Creativity and Innovation Management*, *25*(4), 431-444. http://dx.doi.org/10.1111/caim.12163.

NOROUZINIK, Y., RAHIMNIA, F., MAHARATI, Y., & ESLAMI, G. (2022). Narcissistic leadership and employees' innovative behaviour: Mediating roles of job embeddedness and job engagement. *Innovation*, *24*(3), 355-380. http://dx.doi.org/10.1080/14479338.2021.1897467.

OLDHAM, G. R., & CUMMINGS, A. (1996). Employee creativity: Personal and contextual factors at work. *Academy of Management Journal*, *39*(3), 607-634. http://dx.doi.org/10.2307/256657.

PARKER, S. K., & COLLINS, C. G. (2010). Taking stock: Integrating and differentiating multiple proactive behaviors. *Journal of Management*, *36*(3), 633-662. http://dx.doi.org/10.1177/0149206308321554.

PASTRA, A., KOUFOPOULOS, D. N., SAMAC, N., & JOHANSSON, T. (2021). Behavioral integration in the boardroom. *Team Performance Management*, *27*(3/4), 260-277. http://dx.doi.org/10.1108/TPM-07-2020-0058.

PODSAKOFF, P. M., MACKENZIE, S. B., LEE, J.-Y., & PODSAKOFF, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *The Journal of Applied Psychology*, *88*(5), 879-903. http://dx.doi.org/10.1037/0021-9010.88.5.879. PMid:14516251.

RAUCH, A., WIKLUND, J., LUMPKIN, G. T., & FRESE, M. (2009). Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future. *Entrepreneurship Theory and Practice*, *33*(3), 761-787. http://dx.doi.org/10.1111/j.1540-6520.2009.00308.x.

RIGTERING, J. P. C., & WEITZEL, U. (2013). Work context and employee behaviour as antecedents for intrapreneurship. *The International Entrepreneurship and Management Journal*, *9*(3), 337-360. http://dx.doi.org/10.1007/s11365-013-0258-3.

RINGLE, C. M., SARSTEDT, M., MITCHELL, R., & GUDERGAN, S. P. (2020). Partial least squares structural equation modeling in HRM research. *International Journal of Human Resource Management*, *31*(12), 1617-1643. http://dx.doi.org/10.1080/09585192.2017.1416655.

RUIJTER, H., VAN MARREWIJK, A., VEENSWIJK, M., & MERKUS, S. (2021). 'Filling the mattress': Trust development in the governance of infrastructure megaprojects. *International Journal of Project Management*, *39*(4), 351-364. http://dx.doi.org/10.1016/j.ijproman.2020.09.003.

SCHALK, R., CAMPBELL, J. W., & FREESE, C. (1998). Change and employee behaviour. *Leadership and Organization Development Journal*, *19*(3), 157-163. http://dx.doi.org/10.1108/01437739810210202.

SCHIUMA, G., SCHETTINI, E., SANTARSIERO, F., & CARLUCCI, D. (2021). The transformative leadership compass: Six competencies for digital transformation entrepreneurship. *International Journal of Entrepreneurial Behaviour & Research*. http://dx.doi.org/10.1108/IJEBR-01-2021-0087.

SCHNEIDER, B., & REICHERS, A. E. (1983). On the etiology of climates. *Personnel Psychology*, *36*(1), 19-39. http://dx.doi.org/10.1111/j.1744-6570.1983.tb00500.x.

SCHWEISFURTH, T. G., & RAASCH, C. (2020). Caught between the users and the firm: How does identity conflict affect employees' innovative behavior. *Creativity and Innovation Management*, *29*(3), 380-397. http://dx.doi.org/10.1111/caim.12380.

SEGARRA-CIPRÉS, M., ESCRIG-TENA, A., & GARCÍA-JUAN, B. (2019). Employees' proactive behavior and innovation performance: Examining the moderating role of informal and formal controls. *European Journal of Innovation Management*, *22*(5), 866-888. http://dx.doi.org/10.1108/EJIM-02-2019-0041.

SHALLEY, C. E., & GILSON, L. L. (2004). What leaders need to know: A review of social and contextual factors that can foster or hinder creativity. *The Leadership Quarterly*, *15*(1), 33-53. http://dx.doi.org/10.1016/j.leaqua.2003.12.004.

SHANE, S. A. (1994). Are champions different from non-champions? *Journal of Business Venturing*, *9*(5), 397-421. http://dx.doi.org/10.1016/0883-9026(94)90014-0.

STRAUSS, K., GRIFFIN, M. A., PARKER, S. K., & MASON, C. M. (2015). Building and sustaining proactive behaviors: The role of adaptivity and job satisfaction. *Journal of Business and Psychology*, *30*(1), 63-72. http://dx.doi.org/10.1007/s10869-013-9334-5.

STREINER, D. L. (2003). Starting at the beginning: An introduction to coefficient Alpha and internal consistency. *Journal of Personality Assessment*, *80*(1), 99-103. http://dx.doi.org/10.1207/S15327752JPA8001_18. PMid:12584072.

SWAILES, S. (2004). Commitment to change: Profiles of commitment and in-role performance. *Personnel Review*, *33*(2), 187-204. http://dx.doi.org/10.1108/00483480410518040.

TAMAYO-TORRES, I., GUTIÉRREZ-GUTIÉRREZ, L. J., LLORENS-MONTES, F. J., & MARTÍNEZ-LÓPEZ, F. J. (2016). Organizational learning and innovation as sources of strategic fit. *Industrial Management & Data Systems*, *116*(8), 1445-1467. http://dx.doi.org/10.1108/IMDS-12-2015-0518.

THOMAS, D. C., PETERSON, M. F., & THOMAS, D. C. (2018). *Cross-cultural management: Essential concepts* (4th ed.). SAGE.

THOMKE, S. H. (1998). Managing experimentation in the design of new products. *Management Science*, *44*(6), 743-762. http://dx.doi.org/10.1287/mnsc.44.6.743.

THOMKE, S. H. (2003). *Experimentation matters: Unlocking the potential of new technologies for innovation.* Harvard Business School Press.

TIERNEY, P., FARMER, S. M., & GRAEN, G. B. (1999). An examination of Leadership and employee creativity: The relevance of Traits and Relationships. *Personnel Psychology*, *52*(3), 591-620. http://dx.doi.org/10.1111/j.1744-6570.1999.tb00173.x.

TSEGAYE, W. K., SU, Q., & MALIK, M. (2019). Expatriate cultural values alignment: The mediating effect of cross- cultural adjustment level on innovative behaviour. *Creativity and Innovation Management*, *28*(2), 218-229. http://dx.doi.org/10.1111/caim.12308.

VAN HOOTEGEM, A., NIESEN, W., & DE WITTE, H. (2019). Does job insecurity hinder innovative work behaviour? A threat rigidity perspective. *Creativity and Innovation Management*, *28*(1), 19-29. http://dx.doi.org/10.1111/caim.12271.

WHEATON, B., MUTHEN, B., ALWIN, D. F., & SUMMERS, G. F. (1977). Assessing reliability and stability in panel models. *Sociological Methodology*, *8*, 84. http://dx.doi.org/10.2307/270754.

WOLFE, R. N., LENNOX, R. D., & CUTLER, B. L. (1986). Getting along and getting ahead: Empirical support for a theory of protective and acquisitive self-presentation. *Journal of Personality and Social Psychology*, *50*(2), 356-361. http://dx.doi.org/10.1037/0022-3514.50.2.356.

WOODMAN, R. W., SAWYER, J. E., & GRIFFIN, R. W. (1993). Toward a theory of organizational creativity. *Academy of Management Review*, *18*(2), 293-321. http://dx.doi.org/10.2307/258761.

ZHANG, W., XU, F., & SUN, B. (2020). Openness to experience, job characteristics, and employee creativity: An interactionist perspective. *Social Behavior and Personality*, *48*(4), 1-12. http://dx.doi.org/10.2224/sbp.9047.

ZHOU, J., & HOEVER, I. J. (2014). Research on workplace creativity: A review and redirection. *Annual Review of Organizational Psychology and Organizational Behavior*, *1*(1), 333-359. http://dx.doi.org/10.1146/annurev-orgpsych-031413-091226.

ZHOU, Q., HIRST, G., & SHIPTON, H. (2012). Promoting creativity at work: The role of problem-solving demand: problem-solving demand and creativity. *Applied Psychology*, *61*(1), 56-80. http://dx.doi.org/10.1111/j.1464-0597.2011.00455.x.

ZHU, B., HABISCH, A., & THØGERSEN, J. (2018). The importance of cultural values and trust for innovation: A European study. *International Journal of Innovation Management*, *22*(2), 1-28. http://dx.doi.org/10.1142/S1363919618500172.

SUPPLEMENTARY MATERIAL

Supplementary material accompanies this paper.

Supplementary Data 1 – database

Supplementary Data 2 – SPSS output

Supplementary Data 3 – JASP output

Supplementary data related to this article can be found online at https://doi.org/10.7910/DVN/Q3NLMN

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