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Effects of Types of Organizational Problems on the Use of Management Control System and Organizational Creativity

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Abstract: Creativity is a process through which organizations find solutions to their problems. However, it is necessary to consider the uses of management control systems (MCS) and the types of problems in order to combine them and stimulate the appropriate form of creativity for each problem type. Consequently, this study aims to analyze the effects of types of organizational problems and the uses of MCS on the expected and responsive dimensions of organizational creativity. The study has a descriptive character and was operationalized through a survey with Brazilian startups. The sample consisted of 101 respondents, and the data were analyzed using Exploratory Factor Analysis and Structural Equation Modeling. The results indicate a positive relationship between closed problems and the diagnostic use of MCS and responsive creativity, as well as a positive relationship between open problems and the interactive use of MCS and expected creativity. The mediation hypotheses were not statistically confirmed. The research advances knowledge by showing that management controls in startups do not positively influence organizational creativity and that startups use creativity to solve organizational problems. The study did not encompass all startups in Brazil or different organizational levels; therefore, our results cannot be generalized.

Keywords: Diagnostic use, expected creativity, interactive use, responsive creativity, startups.

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Efectos de los tipos de problemas organizativos en el uso del sistema de control de gestión y la creatividad organizativa

Resumen: La creatividad es un proceso mediante el cual las organizaciones encuentran soluciones a sus problemas. Sin embargo, es necesario tener en cuenta los usos de los sistemas de control de gestión (SCG) y los tipos de problemas para combinarlos y estimular la forma adecuada de creatividad para cada tipo de problema. Por consiguiente, el objetivo de este estudio es analizar los efectos de los tipos de problemas organizativos y los usos de los SCG en las dimensiones esperadas y receptivas de la creatividad organizativa. El estudio tiene un carácter descriptivo y se llevó a cabo mediante una encuesta a startups brasileñas. La muestra estuvo compuesta por 101 encuestados y los datos se analizaron utilizando el análisis factorial exploratorio y el modelado de ecuaciones estructurales. Los resultados indican una relación positiva entre los problemas cerrados y el uso diagnóstico de los SCG y la creatividad receptiva, así como una relación positiva entre los problemas abiertos y el uso interactivo de los SCG y la creatividad esperada. Las hipótesis de mediación no se confirmaron estadísticamente. La investigación avanza en el conocimiento al mostrar que los controles de gestión en las startups no influyen positivamente en la creatividad organizacional y que las startups utilizan la creatividad para resolver problemas organizacionales. El estudio no abarcó todas las startups de Brasil ni los diferentes niveles organizacionales, por lo que nuestros resultados no pueden generalizarse.

Palabras clave: Uso diagnóstico, creatividad esperada, uso interactivo, creatividad receptiva, startups.

Efeitos dos tipos de problemas organizacionais no uso do sistema de controle gerencial e na criatividade organizacional

Resumo: A criatividade é um processo por meio do qual as organizações encontram soluções para os seus problemas. No entanto, é necessário considerar os usos dos sistemas de controlo de gestão (SCG) e os tipos de problemas, a fim de combiná-los e estimular a forma adequada de criatividade para cada tipo de problema. Consequentemente, este estudo tem como objetivo analisar os efeitos dos tipos de problemas organizacionais e os usos dos SCG nas dimensões esperadas e responsivas da criatividade organizacional. O estudo tem caráter descritivo e foi operacionalizado por meio de uma survey com startups brasileiras. A amostra foi composta por 101 respondentes, e os dados foram analisados utilizando Análise Fatorial Exploratória e Modelagem de Equações Estruturais. Os resultados indicam uma relação positiva entre problemas fechados e o uso diagnóstico de SCG e criatividade responsiva, bem como uma relação positiva entre problemas abertos e o uso interativo de SCG e criatividade esperada. As hipóteses de mediação não foram confirmadas estatisticamente. A pesquisa avança o conhecimento ao mostrar que os controles gerenciais em startups não influenciam positivamente a criatividade organizacional e que as startups utilizam a criatividade para resolver problemas organizacionais. O estudo não abrangeu todas as startups do Brasil nem diferentes níveis organizacionais; portanto, nossos resultados não podem ser generalizados.

Palavras-chave: Uso diagnóstico, criatividade esperada, uso interativo, criatividade responsiva, startups.

Introduction

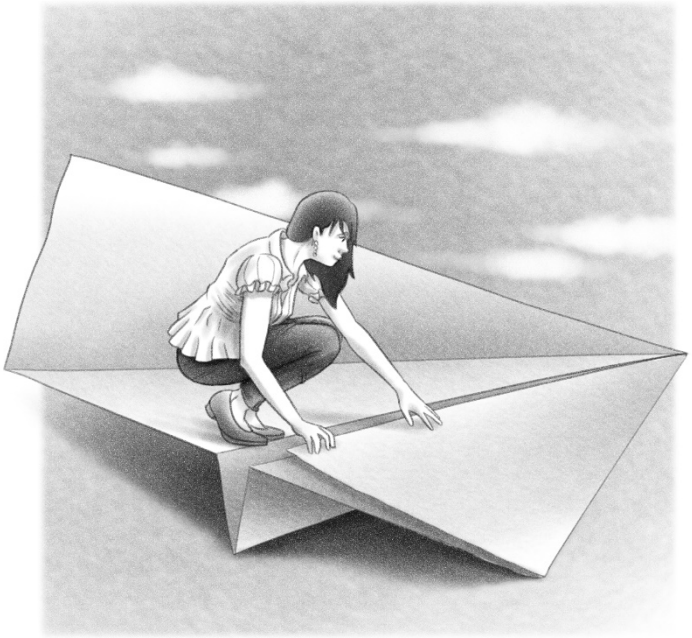
Creativity is a process through which organizations can find solutions to their problems (Cools *et al.*, 2017; Saha & Sharma, 2020). In addition to enabling the development of new services or products (Gupta & Banerjee, 2016), it allows employees to use their imagination and propose new ideas to help the organization improve management practices and address organizational challenges (Adi & Sukmawati, 2020). Thus, creativity can be compared to knowledge systems used to solve problems and enhance organizational effectiveness (Olszak & Kisielnicki, 2016).

Creativity is often regarded as a singular construct based on new and useful ideas, without considering the nature of the idea, its motivations, or its starting point (Unsworth, 2001). However, the creative needs of organizations are not homogeneous, whether due to the adopted strategy or the types of organizational problems faced. Therefore, it seems plausible that the construct of organizational creativity is not unidimensional.

Unsworth (2001) classified four types of organizational creativity. The first is responsive creativity, referring to situations in which the employee solves a presented problem. The second is expected creativity, where the individual has more freedom to be creative, solving problems they have identified themselves. The third type is contributive creativity, where the individual is interested and engaged but focuses on a more specific, often narrower, problem. Finally, in proactive creativity, the individual creates their own reasons and operates according to their own specifications. In organizational environments, the types of creativity typically present are responsive and expected creativity (Cools *et al.*, 2017).

Stimulating organizational creativity requires combining two fundamental factors (Unsworth, 2001): i) extrinsic and intrinsic motivation, which are components of the management control system (MCS), and ii) the characteristics of the problem to be solved, which can vary between open problems (situations where the individual needs to identify the problem and develop a solution) and closed problems (situations where the problem is clear and the solution method is defined).

Although MCSs play a significant role in stimulating creativity, particularly within the framework proposed by Simons (1995), studies highlight the need for different uses of MCSs (Ahrens & Chapman, 2004; Bisbe & Malagueno, 2009; Davila *et al.*, 2009) to stimulate organizational creativity. Using the levers of control model, Speklé *et al.* (2017) demonstrated that the intensity of MCS use is related to managers' perceptions of empowerment, which subsequently results in positive effects on organizational creativity. The results indicate that managers balance the use of control levers to create the necessary dynamic tension to support organizational creativity. In this sense, studies identifying MCSs as facilitators of creativity consider the presence of interactive use and not just diagnostic use (Cools *et al.*, 2017; Kaveski & Beuren, 2020).



In the literature, only Cools *et al.* (2017) considered the possibility of different types of organizational creativity and the need for variations in MCS use. These authors (2017) conducted a multiple case study on the diagnostic and interactive use of budgets in creative companies characterized by different types of creativity, whose results indicated that expected creativity is used to address open problems, while responsive creativity is applied to closed problems. The authors concluded that in expected creative tasks, the collective sense generated by the interactive use of MCSs enables a precise analysis of environmental uncertainties. Conversely, in responsive creative tasks, which involve less strategic uncertainty, budgets are used more diagnostically. Therefore, the type of problem directs the role of MCSs in stimulating different types of creativity, as the degree of interactive or diagnostic use is related to organizational problems and has direct implications for the creative process.

However, it is worth noting that even in closed problems, various solutions are possible. According to Speckbacher (2017), closed problems, being more restricted, sometimes require more creativity than open problems. The author argues that in situations of limited resources, divergent thinking is demanded in a project that would otherwise be approached primarily with convergent thinking (van den Berg, 2016). In other words, solving a closed problem, when reasonable resources are available, can become more open when financial limitations arise.

In this context, the research question guiding this study is: What are the effects of different types of organizational problems on the use of management control systems and organizational creativity? Thus, the objective was to analyze the effects of organizational problem types (open and closed) on the diagnostic and interactive uses of MCSs and on the expected and responsive dimensions of organizational creativity.

Research in management accounting (Aguiar & Suave, 2020; Davila & Ditillo, 2017; Jordan & Messner, 2012; Kaveski & Beuren, 2020) treats creativity as a unidimensional construct, regardless of the problem type, and often focuses on the design of MCSs. This research distinguishes itself by considering the multidimensionality of organizational creativity, addressing the expected and responsive dimensions in relation to MCS use, in addition to exploring MCS use itself. Therefore, this study fills a gap in the literature by offering a new understanding of the role of MCS in creative environments, specifically by expanding the understanding of the relationship between diagnostic and interactive use and types of organizational creativity.

Unlike Cools *et al.* (2017) and Dal Magro *et al.* (2023), who tested budget uses—the former sto stimulate types of organizational creativity and the latter to analyze manager empowerment and creativity—this research advances by broadly addressing MCS use and empirically exploring the role of problem types in the relationship between MCS use and expected and responsive creativity. Thus, it clarifies the importance of problem types, whether open or closed, in this relationship.

This research also contributes to understanding organizational creativity in startups. The importance of investigating startups is emphasized, as they operate in highly dynamic environments and depend on creativity due to the constant innovations they bring to the market (Ocampo *et al.*, 2019). Moreover, they combine control, management practices (Carraro *et al.*, 2019), and creativity (Kaveski & Beuren, 2020).

Following this introduction, the next section presents the literature review and research hypotheses, followed by the study's methods, the research results, and, finally, the conclusions.

Literature review and research hypotheses

During the problem-solving process, the employee or creator needs to understand whether the problem is open or closed (Unsworth, 2001). In a closed problem, the individual knows what the problem is, and the method to solve it is already known. In contrast, in an open problem, the problem is not yet known, and it is therefore necessary to identify both the problem and the method to solve it.

In solving these problems, the type of use (diagnostic or interactive) of the organization's MCS makes a difference. For example, according to Chong and Mahama (2014), diagnostic use

promotes stimulation through strategic alignment, making it more appropriate for solving closed problems. Diagnostic use has a restrictive nature, as it allows the identification of misconduct and enables the alignment of organizational actions. It is also used to motivate, monitor, and reward the achievement of specified objectives (Simons, 1995; Henri, 2006; Bisbe & Otley, 2004). Its purpose is to assist in strategy implementation and guide management in controlling results (Cruz *et al.*, 2015). Thus, based on the literature (Cools *et al.*, 2017; Speckbacher, 2017; Unsworth, 2001), a positive relationship is assumed between closed problems and the diagnostic use of MCS.

H1: There is a positive relationship between closed problems and the diagnostic use of MCS.

An open problem refers to situations in which the individual needs to identify the problem and develop the solution method (Getzels, 2017). The individual first identifies the situation and then seeks to define the problem so that it can be solved (Unsworth, 2001). In the organizational environment, open problems are linked to organizational learning because, before a problem is addressed, the individual must first identify it. For this type of problem, the interactive use of MCS is more appropriate, as it generates organizational learning and impacts performance (Simons, 1995; Henri, 2006), in addition to promoting active dialogue among organization members (Widener, 2007).

Interactive control is used to stimulate new ideas and strategies and enables the monitoring of objectives through feedback and active communication among members. Communication may occur through regular meetings to outline and monitor project progress with the creative team. Creating interactive dialogue between different levels of the organization encourages employees to map the environment, identify potential risks, and develop appropriate methods to address them (Cools *et al.*, 2017).

Therefore, open problems can be better solved (Unsworth, 2001) through the characteristics of interactive use, creating an environment conducive to the emergence of new ways of addressing organizational challenges. Thus, it is expected that open problems (Unsworth, 2001) are positively related to the interactive use of MCS (Simons, 1995), as stated in the following hypothesis:

H2: There is a positive relationship between open problems and the interactive use of MCS.

Closed problems are based on behaviors in which individuals deal with problems whose formulation – and consequently the methods for solving them – are predefined (Getzels, 2017; Unsworth, 2001). This type of problem, being more restrictive, demands more creativity (Speckbacher, 2017). Responsive creativity is tied to demand; that is, problems are only solved when required. Therefore, for the individual/employee to understand the demand, it is necessary to identify the type of problem that needs to be solved.

Additionally, closed problems have restrictive characteristics, meaning that the employee's autonomy is limited, relying only on the tools provided by management. Responsive creativity

reinforces this condition, as the employee's autonomy during the creative process is fulfilled only by following management's instructions. Thus, in both responsive creativity and closed problems, the employee has limited actions (Unsworth, 2001). The literature (Cools *et al.*, 2017; Unsworth, 2001) points out that closed problems are positively associated with responsive creativity, which is why the following hypothesis is proposed:

H3: There is a positive relationship between closed problems and responsive creativity.

Open problems refer to situations in which the individual needs to identify the problem and develop the solution method (Getzels, 2017; Unsworth, 2001), seeking efficient ways to solve it. This type of problem is connected to the individual's creative process (Unsworth, 2001). The prominent feature of open problems lies in the possibility of multiple solutions, and action is stimulated by external motivators (Cools *et al.*, 2017; Unsworth, 2001) within a process of continuous improvement. Expected creativity is linked to different solutions without established procedures, aiming to generate new ideas. In the organizational environment, it encourages the creation of something new and useful (Cools *et al.*, 2017; Unsworth, 2001). Therefore, the following hypothesis is proposed:

H4: There is a positive relationship between open problems and expected creativity.

The interactive use of MCS encourages active dialogue between managers and subordinates about strategic positioning (Widener, 2007). It occurs when senior management uses planning and control procedures to actively supervise and participate in decisions made by subordinates. This involvement enables senior management to analyze and question data, assumptions, and underlying action plans. Consequently, interactive controls require continuous attention from subordinates at all organizational levels (Simons, 1990).

Interactive use promotes creative thinking, leading to new initiatives and creative outcomes that benefit the organization (Simons, 1995). The generation of creative thinking is more strongly stimulated by expected creativity, as noted by Unsworth (2001) and Cools *et al.* (2017). Expected creativity seeks innovative solutions and supports organizational learning. This is consistent with Simons' (1995) findings, which show that the interactive use of MCS fosters dialogue, organizational learning, and the search for new creative solutions. Based on the premises presented in the literature (Cools *et al.*, 2017; Simons, 1995; Speckbacher, 2017; Unsworth, 2001), a positive relationship is assumed between the interactive use of MCS and expected creativity, and a negative relationship with responsive creativity, as stated in the following hypothesis:

H5: The interactive use of MCS (a) positively influences expected creativity and (b) negatively influences responsive creativity.

According to Simons (1995), Henri (2006), Bisbe and Otley (2004), and Speklé *et al.* (2017), diagnostic use provides more structured communication channels, limiting and directing attention

to specific strategic areas and opportunities. The diagnostic MCS acts as a mechanism aimed at objectively measuring and executing organizational activities, aligning individual behavior with organizational goals and ensuring that work is carried out according to the standards required by the organization (Henri, 2006).

The diagnostic use of MCS refers to overseeing the attributes of formal control mechanisms to ensure that the objectives set for a project or task are achieved. It also ensures that corrective actions are implemented whenever discrepancies arise between planned and actual results (Dal Magro *et al.*, 2023; Kaveski & Beuren, 2020; Sakka *et al.*, 2013; Tucker *et al.*, 2021).

Recent studies indicate a positive effect of diagnostic budget use on responsive creativity (Cools *et al.*, 2017). Wouters and Roijmans (2011) show that setting goals for specific objectives can encourage problem-solving and experimentation. Furthermore, Grabner and Speckbacher (2016) point out that predefined goals are used in performance evaluations in creativity-dependent environments.

In line with these studies, responsive creativity is expected to be supported by the diagnostic use of MCS. Therefore, based on the literature (Cools *et al.*, 2017; Unsworth, 2001), a positive relationship is assumed between the diagnostic use of MCS and responsive creativity and a negative relationship with expected creativity:

H6: The diagnostic use of MCS (a) positively influences responsive creativity and (b) negatively influences expected creativity.

Closed problems require predefined rules and objectives for their resolution. They are formulated based on individual behavior and are solved using the tools available in the organization (Getzels, 2017; Unsworth, 2001). Thus, problems are solved according to management controls, and the literature provides evidence that the diagnostic use of MCS can be critical in solving closed problems (Cools *et al.*, 2017).

In this sense, closed problems demand responsive creativity (Cools *et al.*, 2017). The goal-setting process is related to how operational procedures specify the way each action should be carried out (Dal Magro *et al.*, 2023; Kaveski & Beuren, 2020; Nuhu *et al.*, 2022; Simons, 1995). Therefore, when a task is creative but must follow predefined standards for its execution, it reflects responsive creativity (Cools *et al.*, 2017).

Speckbacher (2017) argues that tight budgets can stimulate creativity in closed projects because they impose constraints that demand more creative effort. Thus, in a context where tasks must be executed according to organizational procedures, responsive creativity is present (Cools *et al.*, 2017), and MCS use is understood to be diagnostic. Therefore, it is argued that the diagnostic use of MCS mediates the relationship between closed problems and responsive creativity, as proposed in the hypothesis:

H7: The diagnostic use of MCS mediates the relationship between closed problems and responsive creativity.

Widener (2007) argues that interactive controls encourage innovation and learning. According to Simons (1995, 2000), interactive use stimulates creative thinking to generate new and useful results for the organization. Therefore, the interactive use of MCS may require greater involvement from the creative employee (Cools *et al.*, 2017; Kaveski & Beuren, 2020), enabling them to seek new ideas and techniques to map and solve problems.

Thus, this type of problem is characterized as an open problem, as it is linked to broad possibilities for its resolution (Unsworth, 2001), and may be related to expected creativity. Expected creativity is often associated with a higher level of strategic uncertainty for the organization compared to responsive creativity (Unsworth, 2001).

In summary, the high degree of uncertainty found in a creative task can lead to the interactive use of MCS. According to Cools *et al.* (2017), creative companies that primarily seek expected creativity tend to use their budgets interactively. Thus, it is argued that the interactive use of MCS mediates the relationship between open problems and expected creativity, as proposed in the following hypothesis:

H8: The interactive use of MCS mediates the relationship between open problems and expected creativity.

Based on the previously presented hypotheses, figure 1 illustrates the theoretical model proposed in this research.

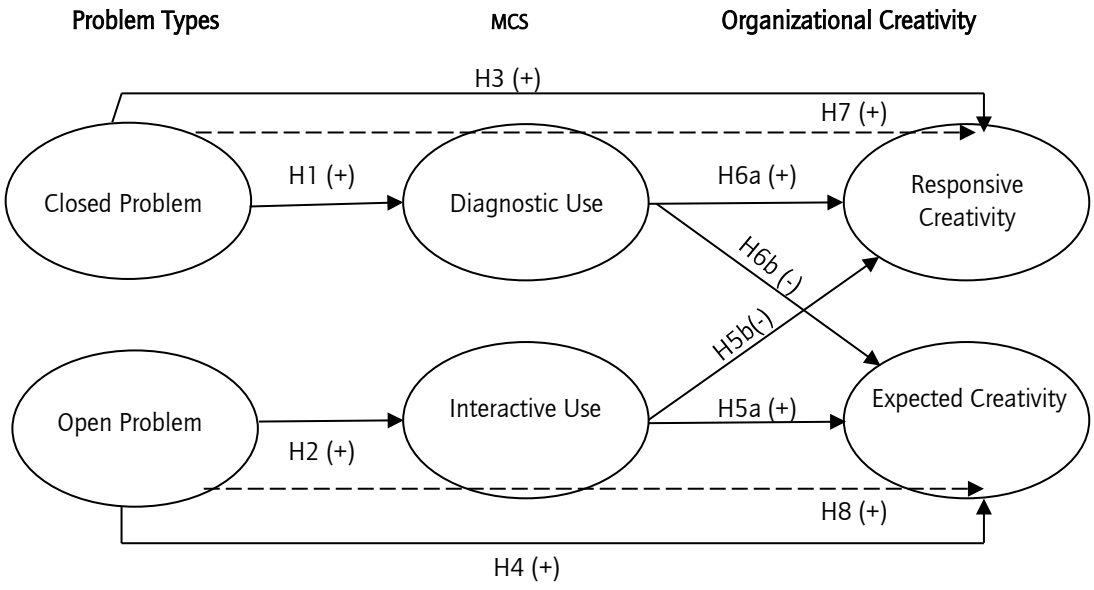


Figure 1. Theoretical model. Source: Authors.

In accordance with the theoretical model, it is assumed that the types of organizational problems and the uses of MCS affect the expected and responsive dimensions of organizational creativity.

Methodology

Sample selection and data collection

The research is characterized as explanatory and quantitative, conducted through a survey. The study population consists of Brazilian startups. To access the target population and compose the sample, LinkedIn users holding positions such as Co-Founder, CEO, Director, Administrator, Manager, Project Coordinator, and Project Analyst were identified. This respondent profile was selected because these individuals occupy strategic or managerial positions or work directly in the creative area of the company, significantly influencing the types of organizational problems, the use of MCSs, and/or the direction of organizational creativity.

To compose the sample, invitations to participate in the survey were initially sent to LinkedIn users who met the previously defined criteria. Of the invitations sent, 300 were accepted, and the survey instrument was then distributed via a link to the questionnaire hosted on the Google Forms platform. Data collection occurred from January to February 2022.

To estimate the minimum required sample size, the software G*Power 3.1.9.2 was used. Following the recommendations of Hair Jr. *et al.* (2021), and using a test power of 0.80, a medium effect size ($f^2 = 0.15$), and three predictors (figure 1), the minimum sample size required for the study was 68 cases. A total of 115 responses were obtained; however, 14 were excluded: 9 due to outliers and 5 due to incorrect completion of the questionnaire. Thus, the final sample consisted of 101 valid responses, an adequate number to estimate the research hypotheses.

Ethical procedures were followed by guaranteeing participants' anonymity, ensuring the confidentiality of information, and analyzing and reporting the results in aggregated form.

Research constructs

The research instrument consisted of 31 assertions. The MCS construct included 9 assertions divided into diagnostic and interactive use dimensions, adapted from Cruz *et al.* (2020): 5 assertions for interactive use (i.1 to i.5) and 4 assertions for diagnostic use (i.6 to i.9). The organizational creativity construct was understood in two dimensions: expected creativity, with 7

assertions (i.10 to i.16), and responsive creativity, with 6 assertions (i.17 to i.22), based on Cools *et al*. (2017). The construct of problem types consisted of 9 assertions based on Unsworth (2001): 5 related to closed problems (i.23 to i.28) and 4 related to open problems (i.29 to i.31). The instrument underwent content validation by three researchers with specific knowledge of the constructs assessed. The construct attributes were measured using multiple items, and respondents' level of agreement was assessed on a Likert scale ranging from (1) "I totally disagree" to (5) "I totally agree."

For the problem types and creativity instruments, which included statements not yet validated, exploratory factor analysis (EFA) was applied. The analysis was conducted using a polychoric matrix and the Robust Diagonally Weighted Least Squares extraction method (Asparouhov & Muthen, 2010). The number of factors to retain was determined using parallel analysis with random permutation of the observed data (Timmerman & Lorenzo-Seva, 2011), and the rotation applied was Robust Promin (Ferrando & Lorenzo-Seva, 2018).

The results—UniCo = 0.82, ECV = 0.70, and MIREAL = 0.30—confirm that the data cannot be treated as unidimensional, and the EFA retained four factors. The results of the Measure of Sampling Adequacy (MSA) indicated the need to exclude three statements: one related to expected organizational creativity, one from the closed problem construct, and one from the open problem construct. The factor score replicability estimates (Ferrando & Lorenzo-Seva, 2018) suggested that all factors are replicable in future studies (H > 0.80). It should be noted that the factorial structure showed adequate fit indices (RMSEA = 0.00; CFI = 0.999; TLI = 1.084), and the precision indicators of the factor scores, Orion and FDI (> 0.80), are considered good.

Data analysis

To verify the existence of common method bias, the guidelines of Podsakoff *et al*. (2003) were followed. After data collection, Harman's single-factor test was conducted, which indicates the presence of common method bias when a large proportion of the variance is explained by a single factor (Podsakoff *et al*., 2003). However, the results showed no evidence of common method bias.

To test the hypotheses, structural equation modeling (SEM) was employed using SmartPLS software. SEM with PLS is appropriate for modeling and understanding complex relationships involving multiple dependent and independent latent variables, defining hypothetical causal relationships based on the combination of theoretical constructs (Nascimento & Macedo, 2016). PLS was chosen because it is capable of estimating complex models with relatively small samples and without requiring assumptions about the statistical distribution of the data (Hair Jr. *et al*., 2021).

To evaluate the relationships in the theoretical model, a two-step analytical procedure was adopted: first, assessment of the measurement model to test the validity and reliability of the research instrument; and second, evaluation of the structural model through analysis of the path coefficients (Hair Jr. *et al.*, 2021).

Results analysis

Structural equation modeling

Structural equation modeling is operationalized in two steps: analysis of the measurement model and evaluation of the structural model (Ringle *et al.*, 2014). The evaluation of the measurement model began with an analysis of the cross-loadings matrix. According to Hair Jr. *et al.* (2021), loadings higher than 0.708 indicate that the construct explains more than 50% of the indicator's variance. However, in social research, it is common to find lower loadings, especially in exploratory instruments such as the one used in this study. In this context, the authors recommend that indicators should only be removed if doing so increases composite reliability or convergent validity (AVE) without compromising content validity.

Thus, six statements were excluded: one related to the diagnostic use of MCS (i.7), three related to expected creativity (i.11, i.13, i.16), three related to responsive creativity (i.17, i.18, i.20), and two related to closed problems (i.25, i.26). Additionally, as shown in table 1, all constructs, after these exclusions, presented values above the recommended thresholds for composite reliability (0.70) and AVE (0.50) (Hair Jr. *et al.*, 2021).

Table 1. Loads, composite reliability and convergent validity of constructs.

	Indicator loads	Reliability composed	Convergent validity (AVE)	Indicator loads	Reliability composed	Convergent validity (AVE)
		Before	Before		After	After
Interactive MCS	i.1 – 0.728	0.857	0.545	i.1 – 0.742	0.855	0.542
	i.2 – 0.744			i.2 – 0.729		
	i.3 – 0.802			i.3 – 0.794		
	i.4 – 0.724			i.4 – 0.735		
	i.5 – 0.690			i.5 – 0.678		
Diagnostic MCS	i.6 – 0.852	0.820	0.547	i.6 – 0.838	0.874	0.700
	i.7 – 0.444					
	i.8 – 0.674			i.8 – 0.740		
	i.9 – 0.901			i.9 – 0.922		

	Indicator loads	Reliability composed	Convergent validity (AVE)	Indicator loads	Reliability composed	Convergent validity (AVE)
		Before	Before		After	After
Expected creativity	i.10 – 0.798	0.795	0.409	i.10 – 0.886	0.846	0.648
	i.11 – 0.495					
	i.12 – 0.679			i.12 – 0.714		
	i.13 – 0.318					
	i.14 – 0.747			i.14 – 0.805		
	i.16 – 0.673					
Responsive creativity	i.17 – 0231	0.256	0.315		0.800	0.577
	i.18 – 0.454					
	i.19 – 0.555			i.19 – 0.604		
	i.20 – 0.260					
	i.21 – 0.852			i.21 – 0.883		
	i.22 – 0.728			i.22 – 0.767		
Closed problem	i.23 – 0.876	0.111	0.448	i.23 – 0,919	0.827	0.707
	i.24 – 0.692			i.24 – 0.754		
	i.25 – 0.489					
	i.26 – 0.554					
Open problem	i.29 – 0.411	0.856	0.670	i.29 – 0.889	0.859	0.674
	i.30 – 0.537			i.30 – 0.891		
	i.31 – 0.235			i.31 – 0.662		

Source: authors.

Subsequently, the discriminant validity of the constructs was assessed to verify their independence, that is, to determine whether the constructs differ empirically. As presented in table 2, discriminant validity was confirmed based on the criteria established by Fornell and Larcker (1981).

Table 2. Discriminant validity - Criterion of Fornell and Larcker (1981).

	1	2	3	4	5	6
1. Open problem	**0.821**					
2. Diagnostic use of MCS	0.100	**0.837**				
3. Expected creativity	0.248	0.372	**0.805**			
4. Closed problem	0.176	0.629	0.631	**0.841**		
5. Interactive use of MCS	0.309	0.266	0.164	0.240	**0.736**	
6. Responsive creativity	0.273	0.443	0.744	0.619	0.235	**0.760**

Source: authors.

The evaluation of the structural model commenced with an analysis of Pearson's Coefficient of Determination (R^2), which measures model quality by indicating the proportion of variance in an endogenous variable explained by the structural model (Ringle *et al.*, 2014). As presented in table 3, the lowest R^2 values among the constructs were 0.09% for the interactive use of MCS and 18.4% for expected creativity, both of which fall at the threshold of small effects. Conversely, the R^2 values for responsive creativity (39.4%) and diagnostic use of MCS (39.6%) are considered large effects.

Table 3. Structural model results.

Variables	R^2	R^2 *adjusted*	Q^2	f^2	VIF
Open problem				0.050	1.000
Closed problem				0.301	1.000
Diagnostic use of MCS	0.396	0.390	0.261	0.139	1.076
Interactive use of MCS	0.096	0.087	0.040	0.106	1.178
Responsive creativity	0.394	0.375	0.206		
Expected creativity	0.184	0.158	0.094		

f^2 effect size: ≥ 0.02 small, ≥ 0.15 medium, and ≥ 0.35 large; Recommended value for VIF variance in action factor < 5 (Hair Jr. *et al.*, 2021). Explained variance R^2: R^2 = 2% is a small effect, R^2 = 13% a medium effect, and R^2 = 26% a large effect (Cohen, 1988); $Q^2 > 0$ (Peng & Lai, 2012).
Source: authors.

The adjusted R^2 values of the endogenous constructs (diagnostic use of MCS, interactive use of MCS, responsive creativity, and expected creativity) comply with the requirements outlined by Hair Jr. *et al.* (2021), indicating that their contribution to the explanatory and predictive capacity of the model is satisfactory. The blindfolding procedure was applied for sample reuse, employing model estimates to predict omitted data points (Hair Jr. *et al.*, 2021), thereby assessing predictive relevance (Q^2). The Q^2 values, which must exceed zero, confirm that the model possesses predictive relevance, and all constructs meet the established criteria.

Additionally, the total effects (f^2) were evaluated, which varied across constructs. In this context, the constructs "Open problem," interactive use of MCS, and diagnostic use of MCS exhibit small effects, whereas the "Closed problem" construct demonstrates a medium effect. Finally, the VIF values below 5 for the independent constructs indicate the absence of collinearity (Hair Jr. *et al.*, 2021). Table 4 presents the analysis of the direct relationships between variables and the mediation tests.

Table 4.Path analysis and hypotheses.

Hypotheses	Variables	β	*t*-value	*p*-value	Decision
H1(+)	Closed problem > Diagnostic use of MCS	0.629	12.762	0.000	Accepted

Hypotheses	Variables	β	*t*-value	*p*-value	Decision
H2(+)	Open issue > Interactive use of MCS	0.309	3.914	0.000	Accepted
H3(+)	Closed issue > Responsive creativity	0.552	5.722	0.000	Accepted
H4(+)	Open issue > Expected creativity	0.212	2.265	0.024	Accepted
H5a(+)	Interactive use of MCS > Expected creativity	0.005	0.065	0.948	Rejected
H5b(-)	Interactive use of MCS > Responsive creativity	0.083	1.224	0.221	Rejected
H6a(+)	Diagnostic use of MCS > Responsive creativity	0.073	0.640	0.522	Rejected
H6b(-)	Diagnostic use of MCS > Expected creativity	0.350	4.228	0.000	Rejected
H7(+)	Closed problem > Diagnostic use of MCS > Responsive creativity	0.046	0.626	0.531	Rejected
H8(+)	Open issue > Interactive use of MCS > Expected creativity	0.002	0.057	0.955	Rejected

Significant at $*p < 0.01$; $**p < 0.05$; $***p < 0.10$.

Source: authors.

The results demonstrate that closed problems have a significant relationship with (H1) the diagnostic use of MCS and (H3) responsive creativity. Conversely, open problems are significantly related to (H2) the interactive use of MCS and (H4) expected creativity. The interactive and diagnostic uses are negatively associated, respectively, with responsive and expected creativity (H5a, H5b, H6a, and H6b). Our results also show that there is no mediation in the relationships between (H7) closed problems and responsive creativity through the diagnostic use of MCS, nor between (H8) open problems and expected creativity through the interactive use of MCS.

Discussion

The first hypothesis examined whether closed problems are positively related to the diagnostic use of MCS, and the statistical results support this proposition ($\beta = 0.629$; $p < 0.01$). These findings align with the arguments of Speckbacher (2017) and Cools *et al.* (2017), who emphasize that MCSs influence both the constraints and objectives of projects, thereby shaping the nature of the problems addressed throughout the creative process.

H2 sought to verify whether the resolution of open problems is positively related to the interactive use of MCS, and this was supported by the results ($\beta = 0.309$; $p < 0.01$). Unsworth (2001) and Getzels (2017) highlight that open problems are associated with situations in which individuals must identify and define the issues that need to be addressed. This finding corroborates the literature on the interactive use of MCSs, as interactive control stimulates new ideas and strategies (Kaveski & Beuren, 2020; Simons, 1995), enabling interaction between managers and subordinates and providing greater freedom in problem-solving.

H3 predicted a direct and positive relationship between closed problems and responsive creativity, and this hypothesis was also supported ($\beta = 0.552$; $p < 0.01$). These findings are consistent with previous research, which identified a positive relationship between closed problems and responsive creativity (Cools *et al.*, 2017; Unsworth, 2001). This relationship may be explained by the fact that closed problems create conditions that lead organizations to rely on responsive creativity to solve closed-type problems (Verhees *et al.*, 2010).

The fourth hypothesis was also accepted ($\beta = 0.212$; $p < 0.01$) and examined whether open problems are positively associated with expected creativity. These findings are consistent with previous studies (Cools *et al.*, 2017; Unsworth, 2001), which found a positive relationship between open problems and expected creativity. This relationship may be explained by the tendency of startups to seek dynamic and creative environments, thereby stimulating expected creativity when addressing open problems.

Individual creativity is essential for an organization's innovation capacity, and MCSs may either enhance or constrain creativity (Aguiar & Suave, 2020; Dal Magro *et al.*, 2023; Davila *et al.*, 2009; Moulang, 2013). Thus, hypotheses H5a and H5b aimed to verify whether the interactive use of MCS is positively related to expected creativity and negatively related to responsive creativity; however, both hypotheses were not supported. These findings contradict the arguments presented by Unsworth (2001), Cools *et al.* (2017), and Speckbacher (2017), who suggest a relationship between interactive MCS use and expected creativity. It is believed that these results may be due to the lack of specification regarding the development stage of the startups during data collection.

Hypotheses H6a and H6b examined whether the diagnostic use of MCS is positively related to responsive creativity and negatively related to expected creativity. Regarding H6a, the results show that diagnostic use does not affect responsive creativity, leading to rejection of the hypothesis. The literature suggests that diagnostic use facilitates goal achievement by following predefined procedures (Kaveski & Beuren, 2020; Moulang, 2013), thus stimulating responsive creativity, which involves solving closed-type problems while adhering to organizational norms and guidelines (Chong & Mahama, 2014). However, the findings of this study diverge from the literature (Chong & Mahama, 2014; Cools *et al.*, 2017), which assumes a positive relationship.

In H6b, the results indicate that the diagnostic use of MCS positively affects expected creativity, contrary to expectations based on Cools *et al.* (2017). Expected creativity involves greater freedom to be creative, identifying and solving problems independently (Cools *et al.,* 2017), whereas diagnostic use operates as a structured mechanism restricting and focusing attention on specific strategic domains to ensure that tasks are performed according to organizational standards (Dal Magro *et al.*, 2023; Henri, 2006; Simons, 1995; Speklé *et al.*, 2017). The divergence in results for both H6a and H6b may be due to differences in the development stages of the startups investigated, which may influence the types and uses of MCSs.

Hypothesis H7 predicted a mediating effect of diagnostic MCS use in the relationship between closed problems and responsive creativity; however, it was not statistically supported. This result contradicts arguments in the literature (Cools *et al.*, 2017; Unsworth, 2001). The lack of mediation may be explained by the fact that the startups in the sample are at varying organizational stages, with early-stage startups requiring more creativity and less control compared to more mature startups.

Finally, H8 predicted the mediating effect of the interactive use of MCS in the relationship between open problems and expected creativity, which was also not confirmed. It is likely that no mediation occurred because the sample did not focus on management control practices, but rather on problem-solving according to the type of creativity. This may occur because startups are often focused on growth, avoiding management controls that could constrain the creative process. As such, the results of H7 and H8 differ from expectations and are not aligned with recent findings such as those of Dal Magro *et al.* (2023), which confirmed that diagnostic and interactive budget use can stimulate actions that influence intentional behavior and increase individual creativity.

The lack of significance in the hypotheses related to MCS use and creativity allows for two inferences. In diagnostic use, managers expect the organization to provide clear communication about how tasks should be performed, enabling them to adjust their routines and make better use of MCSs. Regarding interactive use, they understand that they can adjust or reorganize activities as needed to achieve goals more effectively. Therefore, the lack of significance in these hypotheses may be explained by the balance between the two control levers in the startups analyzed, as suggested by previous research (Dal Magro *et al.*, 2023; Kaveski & Beuren, 2020; Speklé *et al.*, 2017).

Conclusions

The study aimed to investigate the effects of problem types and the use of MCS on organizational creativity. To achieve this, a descriptive survey was conducted with individuals holding strategic and managerial positions in startups, resulting in a final sample of 101 responses obtained through convenience sampling. Structural equation modeling was used for data analysis.

When testing the hypotheses, the findings indicated that closed problems are positively related to the diagnostic use of MCS (H1) and responsive creativity (H3). Open problems are positively related to the interactive use of MCS (H2) and expected creativity (H4). The interactive use of MCS was not positively related to expected creativity (H5a) or responsive creativity (H5b). The diagnostic use of MCS was not positively related to responsive creativity (H6a) and was negatively related to expected creativity (H6b). The mediating effects proposed in hypotheses H7 (the mediating role of the diagnostic use of MCS between closed problems and responsive creativity)

and H8 (the mediating role of the interactive use of MCS between open problems and expected creativity) were also not confirmed.

Cools *et al.* (2017) examined budgeting styles to stimulate types of organizational creativity but did not conduct an empirical analysis that explicitly defined open or closed problems. Dal Magro *et al.* (2023) analyzed budget use in relation to empowerment and creativity but did not differentiate between types of creativity. This research fills this gap by highlighting the need to consider external drivers and problem-solving mechanisms to explain different types of organizational creativity.

The study also contributes to understanding creativity in organizational contexts, particularly within startups, by demonstrating the relevance of the interactions among types of organizational problems, the uses of MCS, and types of creativity. These interactions may influence the development of such organizations. Investigating startups is especially important, as they commonly adopt organizational models that emphasize creativity (Ries, 2012). Startups differ from other types of organizations by focusing on developing innovative ideas while maintaining low operational costs, enabling them to achieve positive results more quickly and efficiently.

This research has various limitations, the most significant being the size and composition of the sample. The study did not include all Brazilian startups or their different organizational levels, as the sample was based on accessibility. Therefore, the generalization of results cannot be guaranteed. Future studies should consider using more representative samples, covering a larger number of organizations and possibly including additional organizational segments. Unsworth's (2001) framework also allows for examining how MCS use may stimulate contributive and proactive creativity. Thus, it is recommended that future research investigate the effects of MCS on internally driven forms of creativity.

References

Adi, M. P. H., & Sukmawati, A. (2020). The effect of levers of control and leadership style on creativity. *Journal of Indonesian Economy and Business*, *35*(3), 236-256. https://doi.org/10.22146/jieb.55466

Aguiar, A. B., & Suave, R. (2020). Pesquisa sobre Criatividade em Contabilidade Gerencial: Visão Geral e Oportunidades de Pesquisa no Contexto Brasileiro. *Revista de Educação e Pesquisa em Contabilidade*, *14*(1). https://doi.org/10.17524/repec.v14i1.2565

Ahrens, T., & Chapman, C. S. (2004). Accounting for flexibility and efficiency: A field study of management control systems in a restaurant chain. *Contemporary accounting research*, *21*(2), 271-301. https://doi.org/10.1506/VJR6-RP75-7GUX-XH0X

Asparouhov, T., & Muthén, B. (2010). *Simple second order chi-square correction*. Mplus technical appendix, 1(1), 1-8. https://www.statmodel.com/download/WLSMV_new_chi21.pdf

Bisbe, J., & Otley, D. (2004). The effects of the interactive use of management control systems on product

innovation. *Accounting, Organizations and Society*, *29*(8), 709-737. https://doi.org/10.1016/j.aos.2003.10.010

Bisbe, J., & Malagueño, R. (2009). The choice of interactive control systems under different innovation management modes. *European Accounting Review*, *18*(2), 371-405. https://doi.org/10.1080/09638180902863803

Carraro, W. B. W. H., Meneses, R., & Brito, C. (2019). Combinação de categorias de práticas de controle de gestão para o alto desempenho de *Startups. Revista brasileira de Gestão de Negócios*, *21*(4), 861-878. https://doi.org/10.7819/rbgn.v21i5.4022

Chong, K. M., & Mahama, H. (2014). The impact of interactive and diagnostic uses of budgets on team effectiveness. *Management Accounting Research*, *25*(3), 206-222. https://doi.org/10.1016/j.mar.2013.10.008

Cohen, J. 1988. *Statistical power analysis for the behavioral sciences*, Hillsdale, NJ: Lawrence Erlbaum.

Cools, M., Stouthuysen, K., & Van den Abbeele, A. (2017). Management control for stimulating different types of creativity: The role of budgets. *Journal of Management Accounting Research*, *29*(3), 1-21. https://doi.org/10.2308/jmar-51789

Cruz, A. P. C. D., Frezatti, F., & Bido, D. D. S. (2015). Estilo de liderança, controle gerencial e inovação: Papel das alavancas de controle. *Revista de Administração Contemporânea*, *19*(6), 772-794. https://doi.org/10.1590/1982-7849rac2015150099

Cruz, A. P. C., Frare, A. B. F., Buchweitz, M. J. R., Quintana, A. C., Pereira, T. A., & D'Avila, L. C. (2020). Associação entre uso do sistema de controle gerencial e desempenho organizacional. *Enfoque: Reflexão Contábil*, *39*(3), 99-113. https://doi.org/10.4025/enfoque.v39i3.48280

Davila, A., Foster, G., & Oyon, D. (2009). Accounting and control, entrepreneurship and innovation: Venturing into new research opportunities. *European Accounting Review*, *18*(2), 281-311. https://doi.org/10.1080/09638180902731455

Davila, A., & Ditillo, A. (2017). Management control systems for creative teams: Managing stylistic creativity in fashion companies. *Journal of Management Accounting Research*, *29*(3), 27-47. https://doi.org/10.2308/jmar-51806

Dal Magro, C. B., Silva, T. B. de J., Lavarda, C. E. F., & Ferla, R. (2023). Different ways of using the budget affect the empowerment and creativity of managers. *Contaduría y administración*, *68*(2), 1-21. http://dx.doi.org/10.22201/fca.24488410e.2023.3161

Ferrando, P. J., & Lorenzo-Seva, U. (2018). Assessing the quality and appropriateness of factor solutions and factor score estimates in exploratory item factor analysis. *Educational and Psychological Measurement*, *78*(5), 762-780. https://doi.org/10.1177/0013164417719308

Getzels, J. W. (2017). *Creativity:* Prospects and issues. In I. A. Taylor & J.W. Getzels (Eds.), *Perspectives in creativity* (pp. 326-344). Routledge.

Gupta, R., & Banerjee, P. (2016). Antecedents of organisational creativity: A multi-level approach. *Business: Theory and Practice*, *17*, 167-177. https://doi.org/10.3846/btp.2016.624

Hair Jr., J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial Least Squares Structural Equation Modeling (pls-sem) Using R: A Workbook*. Springer. https://library.oapen.org/handle/20.500.12657/51463

Henri, J. F. (2006). Management control systems and strategy: A resource-based perspective. *Accounting, Organizations and Society*, *31*(6), 529-558. https://doi.org/10.1016/j.aos.2005.07.001

Kaveski, I. D. S., & Beuren, I. (2020). Influência dos sistemas de controle gerencial e da criatividade sobre o desempenho no trabalho. *Cadernos ebape.br, 18*, 543-556. https://doi.org/10.1590/1679-395120190024

Jordan, S., & Messner, M. (2012). Enabling control and the problem of incomplete performance indicators. *Accounting, Organizations and Society*, *37*(8), 544-564. https://doi.org/10.1016/j.aos.2012.08.002

Moulang, C. (2013). Performance measurement system use in generating psychological empowerment and individual creativity. *Accounting & Finance*, *55*(2), 519-544. https://doi.org/10.1111/acfi.12059

Nascimento, J. C. H. B., & Macedo, M. A. S. (2016). Modelagem de equações estruturais com mínimos quadrados parciais: um exemplo da aplicação do Smartpls® em pesquisas em contabilidade. *Revista de Educação e Pesquisa em Contabilidade, 10*(3), 289-313. https://doi.org/10.17524/repec.v10i3.1376

Nuhu, N. A., Baird, K., & Su, S. (2022). The association between the interactive and diagnostic use of financial and non-financial performance measures with individual creativity: The mediating role of perceived fairness. *Journal of Management Control*, *33*(3), 371-402. https://doi.org/10.1007/s00187-022-00339-6

Ocampo, E., Iacono, A. S., & Leandro, F. R. (2019). Gestão da inovação em empresas de base tecnológica: um estudo de caso em empresas incubadas. *Innovar*, *29(*74), 71-84. https://doi.org/10.15446/innovar.v29n74.82062

Olszak, C. M., & Kisielnicki, J. (2016). Organizational creativity and it-based support. *Informing Science: The International Journal of an Emerging Transdiscipline*, *19*, 103-123. https://doi.org/10.28945/3514

Peng, D. X., & Lai, F. (2012). Using partial least squares in operations management research: A practical guideline and summary of past research. *Journal of operations management*, *30*(6), 467-480. https://doi.org/10.1016/j.jom.2012.06.002

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. *Journal of applied Psychology*, *88*(5), 879-903. https://doi.org/10.1037/0021-9010.88.5.879

Ringle, C. M., Silva, D., & Bido, D. S. (2014). Modelagem de equações estruturais com utilização do Smartpls. *Revista Brasileira de Marketing*, *13(*2), 56-73. https://doi.org/10.5585/remark.v13i2.2717

Ries, E.. *A Startup enxuta*: como os empreendedores atuais utilizam a inovação contínua para criar empresas extremamente bem-sucedidas. São Paulo: Lua de Papel, 2012

Sakka, O., Barki, H., & Côté, L. (2013). Interactive and diagnostic uses of management control systems in is projects: Antecedents and their impact on performance. *Information & Management*, *50*(6), 265-274. https://doi.org/10.1016/j.im.2013.02.008

Saha, S., & Sharma, R. R. K. (2020). The impact of leaders' cognitive style and creativity on organizational problem-solving. *Benchmarking: An International Journal*, *27*(8), 2261-2281. https://doi.org/10.1108/BIJ-09-2019-0398

Simons, H. W. (Ed.). (1990). *The rhetorical turn: Invention and persuasion in the conduct of inquiry.* University of Chicago Press.

Simons, R. (1995). *Levers of control. How managers use innovative control systems to drive strategic renewal.* Harvard Business School Press.

Simons, R. (2000). *Performance measurement and control systems for implementing strategy: Text and Cases.* Prentice Hall.

Speckbacher, G. (2017). Creativity research in management accounting: A commentary. *Journal of Management Accounting Research*, *29*(3), 49-54. https://doi.org/10.2308/jmar-51754

Speklé, R. F., van Elten, H. J., & Widener, S. K. (2017). Creativity and control: A Paradox-Evidence from the levers of control framework. *Behavioral Research in Accounting, 29*(2), 73-96. http://dx.doi.org/10.2139/ssrn.2480471

Timmerman, M. E., & Lorenzo-Seva, U. (2011). Dimensionality assessment of ordered polytomous items with parallel analysis. *Psychological Methods*, *16*(2), 209-220. https://psycnet.apa.org/doi/10.1037/a0023353

Tucker, B., Halkett, I., & James, A. (2021). Necessity: The mother of invention? The tension between management control and creativity: Lessons from Apollo 13. *Journal of Management Accounting Research*, *33*(3), 163-188. https://doi.org/10.2308/JMAR-19-047

Unsworth, K. (2001). Unpacking creativity. *Academy of Management Review*, *26*(2), 289-297. https://doi.org/10.5465/amr.2001.4378025

Van Den Berg, H. (2001), Economic Growth and Development, McGraw-Hill, Singapore.

Verhees, F. J., Meulenberg, M. T., & Pennings, J. M. (2010). Performance expectations of small firms considering radical product innovation. *Journal of Business Research*, *63*(7), 772-777. https://doi:10.1016/j.jbusres.2009.06.006

Widener, S. K. (2007). An empirical analysis of the levers of control framework. *Accounting, Organizations and Society*, *32*(7-8), 757-788. https://doi.org/10.1016/j.aos.2007.01.001

Wouters, M., & Roijmans, D. (2011). Using prototypes to induce experimentation and knowledge integration in the development of enabling accounting information. *Contemporary Accounting Research*, *28*(2), 708-736. https://doi.org/10.1111/j.1911-3846.2010.01055.x