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## Reflexes of Application of Funds on the Design and Use of the Management Control System

### ABSTRACT

**Objective:** This study analyzes the reflexes of application of funds by funding providers on the use of the Management Control System (MCS) mediated by its design in startups.

**Method:** A survey was conducted on 387 startups listed in the Brazilian Startup Association, and the sample consists of 56 valid answers.

**Originality/Relevance:** The research shows that the application of funds by funding providers is directly related to all the design variables of the MCS and only to the boundary system regarding the use of the MCS. This denotes the relevance of analyzing the effects of application of funds on the design and use of the MCS in startups.

**Results:** The survey results show a direct effect on the relationship between application of funds by funding providers and the variables of the MCS design (planning, cybernetic, administrative and cultural controls). The direct effect on the relationship with the use of the MCS (diagnostic, interactive beliefs and boundary control systems) was found only for the boundary system. Mediation indicated stronger relationships between the use of the MCS and planning and cultural controls, while cybernetic and administrative controls did not mediate with all variables.

**Theoretical/Methodological contributions:** The study contributes to the literature on the design and use of the MCS, consonant with application of funds by funding providers, from a theoretical model.

**Keywords:** Application of funds; MCS Design; Use of MCS; Startups.

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## 1 INTRODUCTION

For innovative startups that project high returns, or those already established, considered as emergent and innovative, being able to obtain funds represents a propelling opportunity to put the innovative plan in action. In general, small and young companies resort to internal financing and commercial credit. However, as they grow and their information become more transparent, they have access to other financing options, including venture capital, interim financing and long-term debt financing (Davila, Foster & Jia, 2015).

The herein study focuses on venture capital (Sá, 2017). The presence of venture capital stimulates more accelerated adoption of management control instruments, such as cash budget, analysis of the variation between what was budgeted and the actual figures, approval of operating expenses, approval of capital expenses and product profitability (Davila & Foster, 2005). These authors found out in their research a positive association between venture capital financing and the number of management accounting systems adopted by companies.

In the resource-based view, systems of information and control, in general, are not considered a source of competitive advantage as they do not represent a source of sustainable income and because they cannot be easily transferred (Henri, 2006). The systems of control may represent a cost caused by consuming management attention. However, in general, it has positive effect on performance and on organizational learning (Widener, 2007). They can also integrate the set of the investor's requirements when granting resources to an investee company.

The managerial control held by the investor over the investee is a determinant of the investee's success (Davila et al., 2015). This process induces the investee to the entrepreneurial behavior and performance of startups (Lin, Chen & Lin, 2017). There is also positive social interaction between investor and investee, fostering learning from the corporate investor (Maula, Autio & Murray, 2009). Investors can exercise their power and request that startups change their strategic direction to help corporate investors achieve their goals (Maula et al., 2009), in addition to influencing the design and use of the MCS to exercise control power.

This scenario denotes a gap that instigates a specific field of investigation, startup companies, due to the tension between their capacity for innovation and the need for control. This study opens up a discussion on the design of the MCS, comprising features of technical configuration, and use, representing the different purposes of applying it. Although previous studies, such as Davila et al. (2015), found out a relationship between management control and external investors, they did not examine the extent to which investors influence the management control regarding the design and use of the MCS in startups. In other studies, the scope of analysis considered some of the organizational aspects of the MCS.

Davila et al. (2015) analyzed how startups can more easily obtain capital investments when they have MCS. Henri (2006) investigated the influence of the use of MCS in fostering innovation, organizational learning, market orientation and entrepreneurship. Alves (2010) analyzed the set of the MCS, in its dimensions of design and use, and its contribution to outlining and implementing the organizational strategy. The study conducted by Lin et al. (2017) focused on verifying whether the operational control has a positive relationship with the performance of new enterprises.

These studies reveal a field that deserves investigation on the role of the funding providers in the design and use of the MCS. In this perspective, the following research question was formulated: What are the reflexes of application of funds by funding providers on the use of the MCS (diagnostic, interactive, beliefs and limits) mediated by its design

(planning, cybernetic, administrative and cultural) in startups? Thus, the objective is to verify the reflexes of application of funds by funding providers on the use of the MCS mediated by its design in startups.

Funding providers (investment fund capital, angel investors, resources from grants or other modalities) applying the funds was operationalized based on the study conducted by Davila and Foster (2005). The use of MCS by startups was based on the levers of control model outlined by Simons (1995). The reflex of the interdependence of the design on the use of MCS by startups was based on the package proposed by Malmi and Brown (2008). Joint approach to these frameworks is still incipient in the literature (Alves, 2010).

It is assumed, however, that these elements have interactions that can be impacted by the design of the MCS, analyzed from the perspective of controls as a package (Malmi & Brown, 2008), in startup companies. Due to the capital contribution and its development, startups are driven to design and use control systems, according to Alves (2010) and Crespo, Rodrigues, Samagaio e Silva (2019). However, the designed MCS may not be used effectively, since the control requirements of the resource provider may not be adequate to the operational and strategic needs of the investee.

According to Malmi and Brown (2008), broad and integrated approach to the design of the MCS as a package is important for the development of a more complete theory on how the adoption of the MCS can be useful for organizations. As for the approach to the use of the MCS, the levers of Simons (1995) were considered in several theoretical-empirical studies, and are presumed to be aligned with the innovative characteristics of the startups, as they allow interactivity and definition of performance limits.

This study is relevant for analyzing to what extent application of funds by funding providers can act as an antecedent in the design and use of the MCS in startups. The results of this study can contribute to the development of the theory on MCS, from the perspectives of design and use of control systems, mainly in this field (Davila et al., 2015). For the organizational practice, it was sought to contribute to a theoretical model that advances the understanding of the adoption of MCS by startup companies, whose approach still lacks conclusive empirical evidence (Crespo et al., 2019).

Few studies on new enterprises have been conducted in the context of developing countries, although it is relevant to learn more about new enterprises in countries with similar institutional environments, which can offer valuable implications to other developing countries (Lin et al., 2017). Compared to developed countries, Brazil has high levels of uncertainty in this business environment. This allows companies to restructure the planning of their management controls, the strategic outlining and implementation, as well as to avoid unnecessary investments from a partial view of the MCS set (Alves, 2010).

## **2 THEORETICAL FRAMEWORK AND HYPOTHESES**

### **2.1 Application of funds by funding providers and the design of the MCS**

In order to develop a new product with high market risk, startups need access to financing and investors (Sá, 2017). An alternative to strengthen the entry of new companies in the market is the incentive to the creation of entities that promote investments, which aim at the conversion of new ideas into businesses, fostering connections between entrepreneurs and funding providers for the projects, who become partners of these companies (Davila et al., 2015).

After funding providers make capital contribution to emerging companies, investors start to use procedures to analyze the amount invested and the return on participation in the investee's capital, according to the following stages of the evaluation process: prospecting,

acceleration and divestment (Sandino, 2007). For each of these steps, information from the MCS is required, with purposes compatible with the needs of the company (Bisbe & Otley, 2004; Davila & Foster, 2005). However, the adoption of the MCS is usually driven by the presence of venture capital, increase in the number of employees, increase in revenue and the hiring of executives (Davila & Foster, 2005).

A company may also need more extensive information, for example, to obtain financial information and give attention to employee training (Malmi & Brown, 2008). It may want to include external information (market, customers and competitors), non-financial information (production processes, predictive information and support mechanisms), among others (Chenhall, 2003). In this context, the implementation of the MCS package becomes a differential, designed with control parameters that ensure internal consistency to the demands of the company.

The design of the MCS comprises a recurrent and formalized set of protocols, routines or mechanisms to collect institutionalized information, developed to help managers to make decisions and fulfill their responsibilities (Davila & Foster, 2005). In this perspective, Malmi and Brown (2008) propose a MCS package approach consisting of: planning, cybernetic, reward and compensation, administrative and cultural.

Malmi and Brown (2008) explain that planning has attributes that help companies in control, for example, in setting goals in functional areas, providing standards to be achieved regarding objectives, levels of effort and alignment of behavior expected from members of the organization. Cybernetic controls are considered processes of feedback cycles, represented by performance standards, for the measurement, comparison, information, correction and modification in the systems (Malmi & Brown, 2008).

Rewards and compensations are useful to motivate and improve the performance of individuals and groups, according to the organization's objectives (Malmi & Brown, 2008). In the herein research, rewards and compensations were not considered by investigating companies at different stages of the organizational life cycle and at different stages (prospection, acceleration or divestment), as in the study carried out by Alves (2010). In turn, administrative controls refer to the behavior of employees' responsibilities, in addition to the processes of task specification (Malmi & Brown, 2008). Cultural control comprises the controls of value, symbols and clans.

Malmi and Brown (2008) warn about the need to clarify which definitions of MCS parameters are appropriate to the company's needs, for example, what composes the system, what will be included, what will be left out and why. It can be inferred that the components of the MCS package proposed by Malmi and Brown (2008) can constitute a viable and interesting parameter in verifying the design of the MCS in startups.

The MCS package can favor communication between companies, as resource provider and investee, and assist new ventures in obtaining the necessary resources from corporate investors (Lin et al., 2017). Crespo et al. (2019), in a sample of high-tech and knowledge-intensive startups from Portugal and Norway, found out that different causal paths lead to high standards degrees of the MCS package adoption. Thus the first hypothesis was formulated:

H<sub>1</sub>: There is a direct positive relationship between funding providers applying the funds and the design of the MCS in startups.

## **2.2 Application of funds by funding providers and the use of the MCS**

Methodologies for the valuation of startups are constantly developed in the market. They can be carried out before the stage of prospection and capital contribution of investors,



who envision the future potential of the business and the consistent execution of the company's business plan (Davila et al., 2015). They use analysis criteria such as “market size, attraction, reputation of the founders and executives, distribution channels, innovation, differentiation, technology, barriers to entry, team quality, agreements and alliances, signed contracts, managerial flexibility, development stage”(Sá, 2017, p. 115).

After the prospection, the managers of the investing company need more information to decide whether to continue to invest or sell their shares. With the entry of venture capital into the investee, there is a separation between ownership and control (Jensen & Meckling, 1976), which requires formal monitoring (Davila & Foster, 2005). This separation is associated with agency costs (Jensen & Meckling, 1976), which requires greater control of the operations and the use of MCS in decision making (Davila & Foster, 2005).

The control of operations with the use of MCS goes beyond the purposes of being applied by startups (Alves, 2010). Its use is aimed at serving operational activities and surviving in the market, which depend on its objectives, strategies and context. Crespo et al. (2019) noted in their research that startups do not adopt formal MCSs. Oyadomari, Cardoso, Silva and Perez (2010) investigated the conflict between innovation and the use of diagnostic and interactive control by innovative companies, but noticed its absence due to the fact that innovation is a permanent value of these organizations.

With a view to aligning and supporting organizational strategy, Simons (1995) developed a theoretical model for the use of MCSs, composed of four levers of control: belief systems, boundary systems, diagnostic control systems and interactive control systems. These four levers need to be analyzed together depending on the dynamic tensions, for example, between diagnostic and interactive control systems, or between the belief and boundary systems (Henri, 2006).

The use of diagnostic control system provides motivation and direction to achieve goals, and focuses on correcting deviations from pre-established standards (Henri, 2006), monitored by the company according to its strategy (Widener, 2007). The interactive control system is used to expand opportunities, stimulate the development of new ideas and learning by focusing and promoting dialogue on the company (Henri, 2006). The belief system is used to communicate the corporate culture to all employees, and to reach different people and groups in the organization (Simons, 1995). The boundary system represents the minimum acceptable standards, outlining the acceptable domain of activities and strategies, helping to protect the company against supposed risks (Simons, 1995; Widener, 2007).

MCS aligned with the organizational strategy provides benefits such as support for decision making, resource coordination, replicating solutions adopted by other companies or in compliance with regulations (Chenhall, 2003). The literature presents evidence of the use of MCS by innovative companies with a dynamic perspective, focusing on issues such as dialogue and interaction (interactive use) and the traditional role of feedback (diagnostic use) (Henri, 2006; Oyadomari et al., 2010). It is connected to fundamental values, ethics and identity of entrepreneurs and financiers (use of beliefs) and to the limits of information access and sharing (use of limits) (Simons, 1995; Widener, 2007).

It is assumed that there is guidance from funding providers for the prevention of supposed risks, through the use of MCS. Thus, the second hypothesis was formulated:

H<sub>2</sub>: There is a direct positive relationship between application of funds by funding providers and the use of MCS in startups.

Previous studies analyzed the antecedents of MCS. Widener (2007) investigated associations between strategic uncertainty and risk, control systems and their costs and benefits, such as management attention, learning and performance of the company. Cruz, Frezatti and Bido (2015) explored the leadership style as an antecedent of the use of the

MCSs and their role in technological innovation. The results confirmed that transformational leadership is an antecedent of the interactive use of the MCS and the belief system. Crespo et al. (2019) focused on antecedents of cultural context, strategy, organizational structure and performance, in the adoption of MCS by high-tech startups. The results indicated that strategy and past performance are important antecedents.

The herein study analyzes the effects of application of funds by funding providers as an antecedent of the design and use of MCS in startups. In the specific context of startups, high performance can lead to the adoption of MCS as a sign of the company's ability to deal with future growth (Davila et al., 2015). Other aspects, such as the presence of venture capital, the experience of the executive, the presence of a financial manager, the number of employees and the executive's beliefs regarding planning systems are associated with this decision to adopt MCS (Davila, 2005).

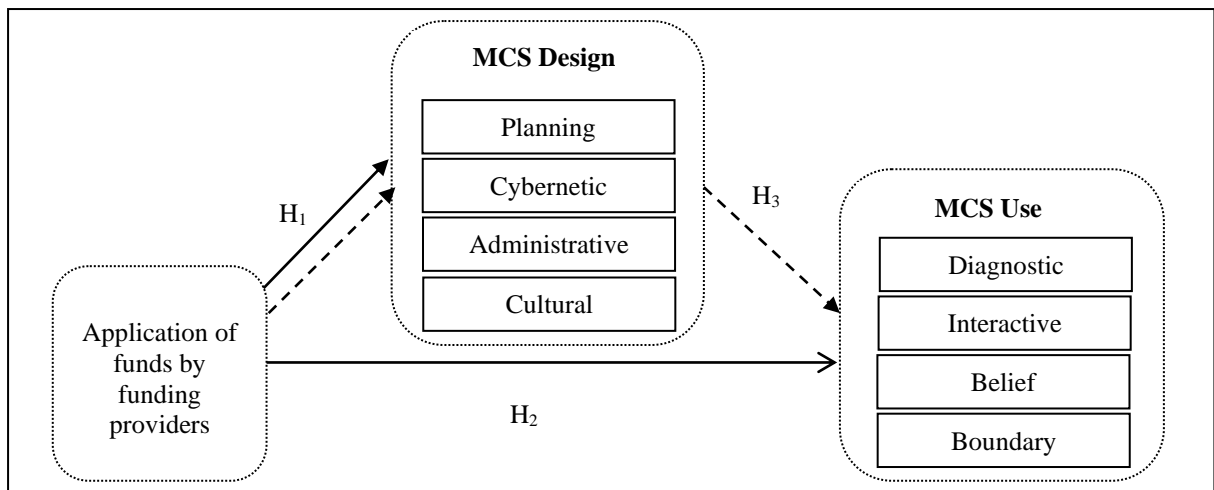
Mas-Verdú et al. (2015) analyzed the impact of incubators on the survival of new companies in a sample of 47 companies operating at the European Center for Business and Innovation in Elche (Spain), based on a set of business characteristics (exports, size, sector, technology). The results show that the incubators alone are insufficient to influence the probability of business survival. New companies must not only use incubators, but also be large. Manufacturing companies using incubators have higher survival rates.

In his study, Widener (2007) points to the existence of multiple interdependence and complementarity between the MCSs. Simons (1995) describes that to balance existing tensions in organizations, the solution lies in formulating the technical design of control systems and understanding how managers use them. Thus, it is essential to analyze and explore the interdependence of the dimensions of design and use of the MCS (Alves, 2010).

The theoretical model of this research has the design of the MCS as a mediator of this relationship. Bisbe and Otley (2004) proposed that the impact of innovation on the company's performance is moderated by the use of the MCS, concluding that this moderation reinforced the explanatory power of the model. Alves (2010) analyzed the set of MCS, in its dimensions of design and use, and identified its contribution to outlining and implementing the organizational strategy based on a case study on a higher education institution. Thus, the third hypothesis was formulated:

H<sub>3</sub>: There is a positive indirect relationship between application of funds by funding providers and use of the MCS, mediated by the design of the MCS.

Figure 1 shows the theoretical model of the research, with emphasis on the formulated hypotheses.



**Figure 1.** Theoretical model of the research

In the theoretical model of the research, it was sought to verify the reflex of having the fund being applied by the funding providers on the use of the MCS mediated by its design. The construct application of funds by funding providers was based on Davila et al. (2015), who investigated an international sample of startups and highlighted detailed adoptions of MCS and financing histories. The findings of the study showed that there was greater intensity of use of MCSs before the financing round; that stock financiers value MCS more than loan financiers; and that companies that are new to the competitive environment are better evaluated.

Lin et al. (2017) investigated the impacts of strategic and operational control on performance in new Chinese ventures. They found out that strategic control has a negative relationship with the performance of new enterprises, but operational control has a positive relationship with the performance of new enterprises. The relationship between the corporate investor and the new enterprise is moderated by type of sector, and the relationship between the two types of control and performance of the new enterprise is moderated by the political ties of the new enterprises. This aspect suggests that the management control is multidimensional and that different types of control by corporate investors have different impacts on the performance of the investees (Lin et al. 2017).

### 3 METHODOLOGICAL PROCEDURES

A survey was carried out in startups that received capital contributions from: investment fund, angel investors and resources from grants, among other modalities. The research population consists of companies listed in the Brazilian Startup Association (Abstartup), which has 387 members. On the institutional website of these companies, it is not informed if they received external capital investments, so the questionnaire was sent to all of them.

The contacts of the Chief Executive Officer (CEO) of the startups were identified on the institutional website and on social networks, such as Facebook® and LinkedIn®, and they were sent invitations through e-mail and social networks to participate in the research. Before sending the research instrument, a pre-test was carried out with a master's student, a doctoral student and a researcher in the area, to test the adequacy of the questionnaire. Then, the questionnaire was sent to the research subjects through Google Docs platform. The data collection period was from November 2016 to February 2017.

The sample size was tested and the 56 valid responses allowed to test the hypotheses. Among the descriptive characteristics of the sample, the amount of male respondents stood out, representing 95%. The average age of the respondents is 40, being the youngest respondent 25 and the oldest 67. On average, respondents have worked at the company for 9 years, with respondents ranging from six months to 25 years in office. In terms of education, approximately 70% of the respondents hold a degree or post graduation / MBA degree, 21% master's degree, 7% doctorate degree and 2% high school diploma.

In the research instrument, the statements regarding the use of diagnostic and interactive control systems were extracted from the study conducted by Henri (2006), and from Widener's (2007) belief and boundary systems. The assertions about the design of the MCS were formulated based on the concepts of the elements of the package proposed by Malmi and Brown (2008). The variables and assertions of the construct application of funds by funding providers were based on the study carried out by Davila et al. (2015), according to Table 1.

**Table 1**  
**Construct of the application of funds by funding providers**

<b>Variables</b>	<b>Assertions/ Formulas</b>
Size (Ln of Current Revenue)	Value of the startup's revenue on the date the investor made the capital contribution. Value of the startup's annual revenue. $\Delta\% \text{ Revenue} = (\text{Revenue}_t - \text{Revenue}_{t-1}) / \text{Revenue}_{t-1}$
$\Delta\%$ of the Operating Profit	Value of the startup's net operating profit on the date the investor made the capital contribution. Value of the startup's annual net operating profit. $\text{Operating Profit}_t - \text{Operating Profit}_{t-1} / \text{Operating Profit}_{t-1}$
Ln of the Amount Invested	Value invested by the investor in the startup.
Change of stage of the investment process	Stage of the investment process that the startup was in December Change of stage (dummy): 1 if there was a change to acceleration and divestment; and 0 for prospection.
Increase in the number of employees	Number of employees of the startup on the date the investor made the capital contribution. $\Delta\% \text{ Number of employees} = (\text{N. Employees}_t - \text{N. Employees}_{t-1}) / \text{N. Employees}_{t-1}$ Growth (dummy): 1 if the annual growth rate of the company's personnel is among the top 50% of the sample; and 0 otherwise.
Ln of more intensity of R&D	Number of employees hired by the startup to work in R&D, regulatory processes, dispute resolution and intellectual property issues. Ln of more research and development intensity, calculated as a percentage of R&D employees of the total employees.

In the study carried out by Davila et al. (2015), the variables and assertions of the construct application of funds by funding providers was called company valuation and measured separately, therefore, differently from the present study. This represents a limitation of this research, at the same time that it instigates additional research to improve the measurement of the construct.

Structural Equations Modeling (SEM) was applied, using the SmartPLS3 program, to test the research hypotheses. The Partial Least Squares (PLS) technique allows testing a set of variables, in order to investigate the level of explanation of the predictor variables for the dependent variables (multiple regression aspects), and the indication of the most important predictor variable (factor analysis) (Klem, 2006).

The study presents a possible vulnerability of the common method bias since it uses data from a single source, collected in a single moment. In line with Podsakoff, Mackenzie, Lee and Podsakoff (2003), it was sought to control the common method bias by ensuring the confidentiality of the individual responses and of the companies surveyed, establishing that only the aggregate results would be reported, ensuring that there are no answers right or wrong and that the answers should represent the organizational environment. Harman's single factor test was also carried out, resulting that only 15.73% of the variation of the variables can be explained by a single factor, lower than the common threshold of 50% (Podsakoff et al., 2003), thus mitigating the concern about the interpretation of the results.



**4 DESCRIPTION AND ANALYSIS OF RESULTS**

**4.1 Measurement model**

When modeling structural equations, the Average Variance Extracted (AVE) of the latent variables was first checked (Hair Jr, Hult, Ringle & Sarstedt, 2016). The results showed that the variable application of funds by funding providers had an index below 0.5, considered as out of the acceptable limit (Hair Jr et al., 2016). In the process of exclusion of low factor load variables, it started with  $\Delta\%$  operating profit, followed by the Ln of more R&D intensity,  $\Delta\%$  number of employees, Ln of the current revenue and change of stage of the investment process. Therefore,  $\Delta\%$  revenue and growth (increase in the hiring of employees above 50%) remained in the model. Davila and Foster (2005) and Sandino (2007) examined the growth in revenues and the number of employees in startups, providing empirical arguments that support the use of these variables in the model. The AVE of the latent variable Application of funds by funding providers after the exclusions resulted in 0.604 (Table 2), therefore higher than 0.50 as indicated by Hair Jr et al. (2016).

Table 2

**Descriptive statistics and measurement model**

Discriminant Validity	AFP	ADM	CYB	BS	CUL	DCS	ICS	LS	PLA
<i>Funding (AFP)</i>	<b>0.777</b>								
Administrative (ADM)	0.410	<b>0.866</b>							
Cybernetic (CYB)	0.255	0.679	<b>0.877</b>						
Belief (BS)	0.269	0.575	0.588	<b>0.910</b>					
Cultural (CUL)	0.256	0.756	0.743	0.702	<b>0.836</b>				
Diagnostic (DCS)	0.289	0.641	0.630	0.547	0.629	<b>0.924</b>			
Interactive (ICS)	0.216	0.559	0.745	0.799	0.782	0.778	<b>0.874</b>		
Boundary (LS)	0.381	0.467	0.329	0.544	0.523	0.494	0.576	<b>0.928</b>	
Planning (PLA)	0.251	0.769	0.700	0.653	0.681	0.813	0.738	0.511	<b>0.912</b>
AVE >0,50	0.604	0.750	0.769	0.827	0.698	0.853	0.764	0.862	0.831
Composite reliability >0,70	0.753	0.923	0.943	0.950	0.902	0.958	0.958	0.961	0.936
<i>R Square</i>	-	0.168	0.065	0.564	0.066	0.681	0.775	0.421	0.063
<i>Cronbach's Alpha &gt;0,70</i>	<b>0.345</b>	0.889	0.924	0.930	0.855	0.942	0.948	0.946	0.898
Mean	1.68	4.60	4.63	5.24	4.67	5.41	5.30	4.54	4.76
Median	0.36	5.00	5.00	6.00	5.00	6.00	6.00	5.00	5.00
Standard deviation	683	1.74	1.78	1.68	1.86	1.61	1.59	1.97	1.51

In the analysis of composite reliability, the latent variable application of funds by funding providers had the lowest index (0.753). According to Hair Jr et al. (2016), the composite reliability analysis has the function of assessing whether the indicator adequately measured the constructs, which must be greater than or equal to 0.70. Therefore, the value found is within the acceptable limit.

To verify the percentage of variance of a latent variable that is explained by other latent variables, R<sup>2</sup> values are analyzed, as it provides an adjustment measure for each structural equation, only for endogenous latent variables, with the indication of values close to 1 (Hair Jr et al., 2016). The value closest to the indicated was the latent variable of administrative control (0.168), a result considered weak. However, because this research involves a theoretical model that has not yet been empirically tested, the results can be admitted as an indication of facts.

Regarding Cronbach's alpha, Hair Jr et al. (2016) clarify that the appropriate value is from 0.60. The latent variable application of funds by funding providers had a value below the

recommended (0.345). Pasquali (2003) argues that low values in the indicator should be put into perspective as, in this case, the literature points to indications that support the structural model and that the item itself influences the total score. Thus, the element in the model was kept because it is an initial study and, despite its limitation, it provides signals for future research.

The composite reliability, highlighted diagonally in Table 2, is superior in all correlations between the constructs of discriminant validity, a criterion recommended by Gaski and Nevin (1985). Pearson's correlation analysis was applied for the other variables, which measures the degree of correlation between two variables and the direction of the correlation (Hair Jr et al., 2016). Strong correlations were only found between the variables of design and use of the MCS, with emphasis between planning and diagnostic (0.813), planning and interactive (0.738), which indicates multidimensionality (Lin et al., 2017) in the design and diagnostic and interactive use of the MCS when planning in startups.

Strong correlation is also observed between the design of the cultural control and the use of the belief system. It is conjectured that this results from the startup presenting the control profile established by the entrepreneur, having reflexes on the cultural control designed for the company. This suggests that a set of organizational definitions is communicated to reinforce values, purpose and direction (Simons, 1995). The strong relationship between cultural control and belief system reinforces its prevalence in scenarios that require minimum standards to protect the company from supposed risks (Widener, 2007).

**4.2 Structural model and hypotheses test**

To test the hypotheses, the structural model path diagram was analyzed. According to Hair Jr et al. (2016), the recommendation is that the t-values should be greater than 1.96 for  $p < 0.05$ . Table 3 shows the direct effect of application of funds by funding providers on the MCS design (planning, cybernetic, administrative and cultural) and the use of MCS (diagnostic and interactive control systems, belief and boundary systems).

Table 3

**PLS Results – Path Coefficients – Direct Effect**

Structural Relation	Hip.	Beta	T-test	P-value	Decision
AFP→PLA	H <sub>1</sub>	<b>0.251</b>	<b>2.066</b>	<b>0,039**</b>	<b>Accepted</b>
AFP→CYB	H <sub>1</sub>	<b>0.255</b>	<b>2.126</b>	<b>0.034**</b>	<b>Accepted</b>
AFP→ADM	H <sub>1</sub>	<b>0.410</b>	<b>3.638</b>	<b>0.000***</b>	<b>Accepted</b>
AFP→CUL	H <sub>1</sub>	<b>0.256</b>	<b>2.076</b>	<b>0.038**</b>	<b>Accepted</b>
AFP→DCS	H <sub>2</sub>	0.100	1.491	0.136	Rejected
AFP→ICS	H <sub>2</sub>	0.069	1.414	0.158	Rejected
AFP→BS	H <sub>2</sub>	0.106	1.364	0.173	Rejected
AFP→LS	H <sub>2</sub>	<b>0.285</b>	<b>2.712</b>	<b>0.007**</b>	<b>Accepted</b>

Legend: AFP= Application of funds by funding providers; PLA= Planning control; CYB= Cybernetic control; ADM= Administrative control; CUL= Cultural control; DCS= Diagnostic control systems; ICS= Interactive control systems; BS= Belief systems; LS= Boundary systems.

Note: Significant at the level of \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.001$ .

The direct effect between application of funds by funding providers and the design variables of the MCS is statistically significant, with  $p < 0.05$ . This supports H<sub>1</sub>, regarding the existence of a direct positive relationship between the effects of application of funds by funding providers and the design of the MCS. These results are consistent with the arguments of Malmi and Brown (2008), that managers use more the MCSs to support their decisions or

support the activities of their subordinates when the design is configured as a package. The company becomes more attractive to external investors (Davila et al., 2015) if the design of the MCS is adequate to what is required from them in the decision making.

The direct effect between the application of funds by funding providers and the variables of use of the MCS was statistically significant, at the level of 0.05, only for the variable boundary systems. This fact allows the partial acceptance of H<sub>2</sub>, which proposes the existence of a direct relationship between application of funds by funding providers and the use of the MCS. The relationship with the boundary system can be explained based on what Davila et al. (2015) described, that several startup companies grow suddenly, requiring business functions, management hierarchies, team work and coordination of the workforce.

This control is performed to avoid errors and supposed risks. To this end, companies apply codes of business conduct (Widener, 2007). In the case of startups, it is believed that there aren't formalized codes of conduct, but there is communication within the workforce to prevent leakage of confidential information, internalization of knowledge of intellectual capital, compliance with the regulations of the company sector, patenting of ideas and legal care. These are limit procedures necessary to avoid risks to startups.

It is argued that application of funds by funding providers having a non-significant relationship with diagnostic, interactive and belief control systems stems from the fact that a startup entrepreneur is initially aware of the ability to operate his business. The entrepreneur directs the company, makes things happen, without control for monitoring, because the concern being making the company grow (Sá, 2017).

Table 4, presents the results of the tests of hypothesis H<sub>3</sub>, of the indirect effects exerted by the mediation of the variables of design of the MCS in the relationship between application of funds by funding providers and the variables of use of the MCS.

Table 4  
**PLS Results – Path Coefficients – Indirect Effect**

Structural Relation	Hip.	Indirect Effect	T-test	P-value	Sobel test	Decision
AFP→PLA→DCS	H <sub>3</sub>	<b>0.736</b>	<b>4.233</b>	<b>0.000***</b>	1.829	<b>Accepted</b>
AFP→PLA→ICS	H <sub>3</sub>	<b>0.506</b>	<b>2.940</b>	<b>0.003**</b>	1.623	<b>Accepted</b>
AFP→PLA→BS	H <sub>3</sub>	<b>0.396</b>	<b>1.829</b>	<b>0.068*</b>	1.369	<b>Accepted</b>
AFP→PLA→LS	H <sub>3</sub>	<b>0.434</b>	<b>2.601</b>	<b>0.010**</b>	1.676	<b>Accepted</b>
AFP→CYB→DCS	H <sub>3</sub>	0.063	0.548	0.584	0.649	Rejected
AFP→CYB→ICS	H <sub>3</sub>	<b>0.265</b>	<b>2.434</b>	<b>0.015**</b>	1.521	<b>Accepted</b>
AFP→CYB→BS	H <sub>3</sub>	0.010	0.096	0.924	0.086	Rejected
AFP→CYB→LS	H <sub>3</sub>	<b>-0.325</b>	<b>2.357</b>	<b>0.019**</b>	-1.551	<b>Accepted</b>
AFP→ADM→DCS	H <sub>3</sub>	-0.117	0.893	0.372	-0.965	Rejected
AFP→ADM→ICS	H <sub>3</sub>	<b>-0.481</b>	<b>2.734</b>	<b>0.006**</b>	-2.157	<b>Accepted</b>
AFP→ADM→BS	H <sub>3</sub>	-0.188	1.114	0.266	-0.955	Rejected
AFP→ADM→LS	H <sub>3</sub>	-0.145	0.805	0.421	-0.935	Rejected
AFP→CUL→DCS	H <sub>3</sub>	0.144	1.284	0.200	1.050	Rejected
AFP→CUL→ICS	H <sub>3</sub>	<b>0.587</b>	<b>3.904</b>	<b>0.000***</b>	1.742	<b>Accepted</b>
AFP→CUL→BS	H <sub>3</sub>	<b>0.539</b>	<b>3.045</b>	<b>0.002**</b>	1.672	<b>Accepted</b>
AFP→CUL→LS	H <sub>3</sub>	<b>0.506</b>	<b>3.045</b>	<b>0.002**</b>	1.694	<b>Accepted</b>

Legend: AFP= Application of funds by funding providers; PLA= Planning control; CYB= Cybernetic control; ADM= Administrative control; CUL= Cultural control; DCS= Diagnostic control systems; ICS= Interactive control systems; BS= Belief systems; LS= Boundary Systems.

Note: Significant at the level of \*p<0.1; \*\*p<0.05; \*\*\*p<0.001.

The significant relationships observed in Table 4 denote positive indirect effects of application of funds by funding providers on some variables of use of the MCS, mediated by

some variables of system design. Thus, H<sub>3</sub> is partially accepted, as it anticipates a positive indirect effect on the relationship between application of funds by funding providers and use of the MCS, mediated by the design of the MCS.

When analyzing mediation, there are stronger relationships between the application of funds by funding providers and the use of MCS, mediated by the planning control and cultural control, and cybernetic and administrative controls were not mediated by most variables. This may be a consequence of the stages that startups are in, mainly in the conception and in development of ideas, in which planning and culture are initially configured.

Consubstantiated in the teachings of Barron and Kenny (1986), Sobel test was used to verify the normal distribution for the indirect effect of the independent variable on the dependent variable via mediating variable. This approach proposes to calculate each of the model's paths and determine whether the mediating variable reaches statistical significance. In the present study, it is observed that the tests predict a normal distribution for the mediating variables of planning and cultural control.

### 4.3 Discussion of results

The results show that the planning control (business plan) is essential to the constitution of the company, and that growing companies need more people to work and functional goals to guide the efforts and behaviors (Malmi & Brown, 2008). At this stage starts the departmentalization of the company in order to specialize the customer service, gain scale and space. Without the alignment of objectives in the functional areas (Malmi & Brown, 2008), the hired people and the entrepreneur can be left without direction.

Regarding cybernetic control, the assertions on the feedback process stood out, which allows the comparison of the results of activities with the standard and the feedback of the system (Malmi & Brown, 2008). According to Sá (2017), the investment values in startups are attributed or subtracted to the following methods: *berkus* (evaluates the quality of the team, ideas, stage of development, quality of managers and sales stage); *scorecard* (evaluates strength and quality of the team, dimension of the opportunity, product, competitive environment, marketing, sales and partnership channels, need for additional capital); *risk factor simulation* (assign points for each criterion according to time, business stage, competition, policy, manufacturing, sales, capital, technology, legal, international and reputation).

With the increase in revenues and the hiring of employees, variables observed in application of funds by funding providers, the entrepreneur will also pay attention to the administrative controls for the formal monitoring of the startup. The results showed a coefficient of 0.410, at the significance level of 0.001, for the direct effect of the relationship between application of funds by funding providers and administrative control. Its relevance is in what was observed by Davila and Foster (2005), that managers and controllers need more information when making decisions and prove how right/wrong the decisions were when obtaining resources from investors.

In line with the strong presence of the entrepreneur's beliefs and values in the startup, the cultural control described by Malmi and Brown (2008) showed a significant relationship. In addition to explaining values and beliefs, the communication habit to control the behavior of the workforce stands out. Therefore, the results that reveal direct positive effect of the application of funds by funding providers on the design variables of the MCS (planning, cybernetic, administrative and cultural) support the non-rejection of H<sub>1</sub>.

In the relationship between application of funds by funding providers and the use of the MCS (diagnostic and interactive control systems, belief and boundary systems), the

positive direct effect was significant at the level of 0.05 only for the variable boundary systems. Thus, there is support for the partial non-rejection of H<sub>2</sub>.

For the latent planning variable, a significant positive relationship was identified in the mediation between application of funds by funding providers and all the variables of use of the MCS. In the diagnostic control system, a high correlation coefficient (0.736) and significance level of 0.001 were identified. A possible explanation for this result is that these systems are formal, based on analysis of variances (Simons, 1995), and provide direction for the achievement of goals (Henri, 2006). It is conjectured that the use of the diagnostic control system is motivated by the interest in verifying the how the financial resource is applied and assessing whether the startup is following the plan negotiated.

For the interactive control system, planning also proved to be significant, indicating that meetings and discussion of data with everyone involved and the development of a common vocabulary are encouraged (Henri, 2006). The organization knows where it wants to go, plans and communicates it to those involved. According to Sandino (2007), companies that emphasize product differentiation are likely to add more flexible sets of controls, such as the interactive.

Regarding the belief system, there was statistical significance at the level of 0.10. As empirical evidence, it is consistent with the teachings of Simons (1995), who emphasizes values and ethics. Such information will reflect on how the company will plan to face of the need to conquer a position in the market. Finally, with significant relation to the level of 0.05, and a correlation coefficient of 0.434, there are the planning control and the boundary system. Setting limits to the employees helps to protect the company against supposed risks (Simons, 1995; Widener, 2007).

Cybernetic control, in the mediation between application of funds by funding providers and the variables of use of the MCS, did not present statistical significance for the diagnostic control system and the belief system. Davila and Foster (2005, p. 1044) argue that in companies in the early stages, "informal interactions are sufficient to satisfy information needs, but that as they grow, increasing the scale requires information infrastructure". However, cybernetic control is related to the interactive control system (coef. 0.265 and sig. 0.05), indicating concern with flexibility and learning, and the boundary system (coef. -0.325 and sig. 0.05), negatively related, reinforcing the existence of measures that quantify possible risks in the business, but it goes against the expectations of H<sub>3</sub>.

For administrative control, no statistical significance was found with the variables of use of the MCS. The assumption is that startups are more interested in analyzing market signals and revenue growth than in controlling internal processes. For cultural control, only the variable diagnostic control system was not statistically significant. This suggests that, for startups, diagnosing is not a priority, it is important to be flexible and adapt to the needs of the market. Henri (2006) highlights restrictive aspects of the diagnostic control system, such as concentration on deviations.

Henri (2006) reinforces the use of interactive controls to expand opportunities, by stimulating the development of new ideas and learning, and fostering dialogue in the company. This may justify the fact that the cultural control and the interactive control system have reached significance at the level of 0.001. For the relationship between cultural control and belief system, there was also significance at the level of 0.05, as well as between cultural control and boundary systems. This reinforces the conjecture that the entrepreneur's profile determines the startup's controls and that they reflect on the minimum standards, the protection of the reputation and the prevention of supposed risks (Simons, 1995; Widener, 2007).



## 5 CONCLUSIONS

In the analysis of the direct relationship between application of funds by funding providers and the design of the MCS (planning, cybernetic, administrative and cultural), the results led to the non-rejection of  $H_1$ . For planning control, Malmi and Brown (2008) support that growing startups need functional goals to guide efforts and behaviors. For cybernetic control, in line with the arguments of Malmi and Brown (2008), the results reveal that this control is used in the feedback and comparisons of company standards, in addition to providing feedback to the system. As for the administrative control, the results are consistent with Davila and Foster (2005) on the managers' need for obtaining information about their enterprise. Cultural control presents evidence in line with Malmi and Brown (2008), with evidence that the startup has the style of the entrepreneur, through the transposition of his values and beliefs.

As for the existence of a direct relationship between application of funds by funding providers and the use of MCS (diagnostic and interactive control systems, belief and boundary systems), the results support the partial non-rejection of  $H_2$ , as a significant relationship was found only for the boundary system. Oyadomari et al. (2010) and Davila et al. (2015) highlight that the boundary system contributes to avoid errors and supposed risks in startups. In this perspective, it is believed that the significance found for the boundary system is due to the accelerated growth of the startups and the need to avoid problems of leakage of confidential information, internalization of intellectual capital and patenting of ideas.

In the analysis of the indirect relationship between application of funds by funding providers and the use of the MCS, mediated by the design of the system, there was support for the partial non-rejection of  $H_3$ . Planning control showed a significant relationship for all the variables of use of the MCS. For cybernetic control, the results indicated a positive indirect effect for the relationship with the interactive control system and a negative indirect effect for the boundary system. Cultural control had an indirect effect on the relationship with interactive control, which fosters the dialogue, the development of new ideas and learning. It also had an indirect effect on the relationship with the belief system and the boundary system, indicating tension between them.

Based on the results, it is concluded that application of funds by funding providers is directly related to all the variables of the design of the MCS and only to the boundary system of the use of the MCS. However, in the indirect effect, a significant relationship was found between application of funds by funding providers and the use of the MCS through the mediation of various elements of the design of the MCS. Based on these results, it is argued that application of funds by funding providers has more reflexes on the design than on the use of MCS in the startups surveyed, which is consistent with the support given by funding providers to startup companies, which are still formulating their control systems.

The results have theoretical implications by highlighting different situations of control systems for startups in comparison with traditional companies reported in the literature, since in startups there is a prevalence of the capacity for creation and velocity of innovation. These results can be sparingly useful to funding providers and to startups, for adapting the design of MCS in accordance with the necessary emphases on control (planning, cybernetic, administrative and cultural) in each evolutionary stage of the startup, at the same time that they can encourage the balanced use of the control levers (diagnostic and interactive control systems, belief and boundary systems).

It is noteworthy that the rewards and compensation element of the package postulated by Malmi and Brown (2008) was omitted because this research comprises startups at different life cycle stages and in different negotiation phases. On the other hand, the study presents

opportunities in view of the fragility inherent to the antecedent variable of the structural model (application of funds by funding providers), with the definition of other metrics for measuring the construct. It is also recommended to expand the sample, punctuating the difficulty of reaching the group of startups invested in by funding providers. In-depth studies on startup company invested in by a funding provider and interviews with the managers of the investment fund are also recommended to triangulate the results of the perception on the design and use of the MCS.

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## Reflexos da Aplicação de Funding no Desenho e Uso do Sistema de Controle Gerencial

### RESUMO

**Objetivo:** Este estudo analisa os reflexos da aplicação de recursos por provedores de funding no uso do Sistema de Controle Gerencial (SCG) mediado pelo seu desenho em startups.

**Método:** Uma survey foi realizada em 387 startups listadas na Associação Brasileira de Startups, e a amostra compõe-se de 56 respostas válidas.

**Originalidade/Relevância:** A pesquisa revela que a aplicação de recursos por provedores de funding está relacionada de forma direta com todas as variáveis de desenho do SCG e apenas com o sistema de limites quanto ao uso do SCG. Isso denota a relevância de se analisar os efeitos da aplicação de funding no desenho e uso do SCG em startups.

**Resultados:** Os resultados da pesquisa mostram efeito direto na relação entre aplicação de recursos por provedores de funding e as variáveis de desenho do SCG (controles de planejamento, cibernético, administrativo e cultural). Já o efeito direto na relação com o uso do SCG (sistemas de controle diagnóstico, interativo, crenças e limites) foi constatado apenas para o sistema de limites. A mediação indicou relações mais fortes do uso do SCG com controles de planejamento e cultural, enquanto que os controles cibernético e administrativo não apresentaram mediação com todas as variáveis.

**Contribuições teóricas/metodológicas:** O estudo contribui para o corpo da literatura sobre o desenho e uso do SCG, consoante com a aplicação de recursos por provedores de funding, a partir de um modelo teórico.

**Palavras-chave:** Aplicação de funding; Desenho do SCG; Uso do SCG; Startups.

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