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Product innovation and performance in SME's: the role of the creative process and risk taking

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ABSTRACT

Creativity is an essential source of innovation for small and medium enterprises (SMEs). Moreover, one challenge in SMEs is to transform the novel and useful ideas that arise from creativity into innovation, hence the interest of researchers in advancing knowledge in this area. This study analyses: (a) how the creative process influences the results of creativity, (b) the role that risk-taking plays as a mediator in the relationship between creativity and product innovation, and (c) the impact of innovation on the performance of SMEs. The research model is validated with data from 139 Chilean industrial SMEs, using the Partial Least Square (PLS) method. The results show the importance of the creative process is different stages in SMEs. It also shows that risk-taking serves as an enabler in SMEs' ability to turn creativity into product innovation. We conclude our findings by illustrating the positive effect of product innovation on SMEs' performance, a crucial issue in their competitiveness. These findings allow managers to verify that creativity is not a random result but an intentional process.

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Creative process; creativity; performance; product innovation; SMEs

Introduction

Creativity plays an essential role in developing new products (Du et al., 2019) and represents a critical competitive advantage factor (Henker et al., 2015). From a resource-based perspective, creativity is an essential intangible resource for companies (Im et al., 2013), where creativity and innovation are as important as it is challenging to achieve (Filser et al., 2018).

Creativity is defined as the generation of ideas that are original and useful (Amabile, 1996; Runco & Jaeger, 2012), whereas innovation means the implementation of these ideas into new products (Amabile & Pratt, 2016). In an organisational context, creativity involves several defined stages that make up the creative process (Georgiev & Georgiev, 2018). If the creative process is not developed correctly, the quality of creative production and innovative behaviours will be affected (Saeed et al., 2019). The study of the creative process is therefore of keen interest to managers and academics (Hughes et al., 2018). Although creative ideas facilitate positive results through innovation (Sarooghi et al., 2015), the conversion is not always direct. The company must be tolerant of risks (Stojcic

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et al., 2018) and facilitate workers' ability to produce innovative ideas (Darvishmotevali, 2019).

Despite the growing body of research on creativity and innovation, there are several gaps that the literature has not explored sufficiently. Within the framework of innovation, only a few studies have focussed on the creative process (An et al., 2018; Mahmood et al., 2019), hence the need to investigate the role of the creative process to develop a more comprehensive understanding (Ou et al., 2018; Tan et al., 2017a). Studies of creativity and innovation specifically with in SMEs have received little attention (Abdul-Halim et al., 2019).

The relationship between creativity and innovation is interesting for SMEs (Perkins et al., 2017) because the conversion of creative ideas into new products is considered a central challenge of innovation (Sarooghi et al., 2015). SMEs depend on creativity to improve their innovation performance (Gama et al., 2019), but a lack of resources hampers this process in emerging economies (Games & Rendi, 2019). Finally, although the interrelated nature of risk and creativity is understood, a concrete theory of how risk explains creative behaviour remains weak (Somsing & Aissa, 2017). Current studies generally focus on risk-taking at an organisational level, without taking into account the complexity involved in generating creative ideas and their translation into innovation (García-granero et al., 2015). de Vasconcellos et al. (2019) stated that creativity is a necessary but insufficient condition to stimulate innovation.

The goal of this work is to analyse the role of the creative process in product innovation and SME's performance. The mediating effect of risk-taking between creativity and product innovation in SMEs is also analysed. The current environment makes it necessary to understand and manage creativity and innovation for the success of companies (Lee et al., 2019), so we seek to answer the following research questions:

Does the creative process influence the creativity results of SMEs?

Is the relationship between creativity and product innovation direct, or does risk mediate it?

Does the development of product innovations in SMEs affect their performance?

To achieve this, an empirical study is performed with a sample of 139 Chilean industrial SMEs, using structural equation modelling. Studying Chilean manufacturing is especially interesting. During the last decade, the Chilean government has promoted measures to improve the national innovation system, doubling the budget for innovation projects. These public programmes have a positive effect on product innovation for large companies (Heredia et al., 2019). According to the latest innovation survey, however, only 7.4% of Chilean companies have innovated in products (Instituto Nacional de Estadisticas, 2018), a situation that they share with other Latin American and emerging countries (Geldes & Felzensztein, 2013).

Studies of the creative process are still scarce (Fortwengel et al., 2017), and there are calls to study the factors that influence the processes of implementation of creativity and innovation (Kim & Chung, 2017). Our research makes several contributions to the literature, as the conceptual framework in Figure 1 illustrates. Firstly, the work explores the creative process in SMEs, from the definition of the problem to the generation of ideas (Caniëls, 2019). We show that creativity is not a random process, but comes from developing a series of intentional stages (Zhang & Bartol, 2010). Secondly, SMEs have difficulties in transforming novel and useful ideas into innovations. Despite the growing

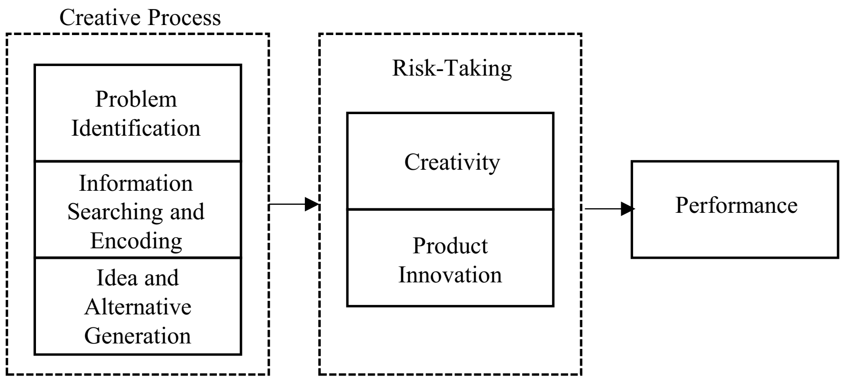

Figure 1. Conceptual framework.

literature on creativity, there is a call for empirical research on innovation and creativity in SMEs (Haase et al., 2018). Risk-taking is considered relevant to improve innovation capacity (Raghuvanshi et al., 2017). Our study contributes to the critical role of risk-taking in mediating the ability to turn creativity into innovation. Identifying how to improve SMEs' innovation capacity is increasingly important (Yu et al., 2019) and we provide a path that will allow SMEs to improve their performance by selecting the practices that will allow them to turn creativity into innovation.

Theoretical background and hypotheses

The terms 'creativity' and 'innovation' can be confused. Taha et al. (2016) explain this difference: 'Creativity is closely related to the development of new useful ideas, while innovation is the successful development of new ideas.' Creativity is used to define the creation of new, but not necessarily useful ideas, and innovation is used to refer to the process of converting a new idea into something that is considered useful (Amabile & Pratt, 2016). In the field of business, creativity is defined as the generation of new and useful ideas in any domain (Amabile, 1996), while innovation implies the implementation of ideas in new products and processes (Sarooghi et al., 2015). Creativity involves a series of stages that constitute the creative process (Georgiev & Georgiev, 2018). There are two valid theoretical perspectives of the creative process (Rosing et al., 2018): the linear perspective assumes a sequence of stages and the perspective of complexity, which believes that the creative stages are intertwined. Although the models differ in the number of stages and specific content of each stage (Reiter-Palmon & Murugavel, 2018), the linear perspective offers better results (Rosing et al., 2018). All stages of the linear creative process are essential (Reiter-Palmon & Leone, 2019) and failure to correctly complete a stage will lead the actors to step back in the process (Doran & Ryan, 2017).

The creative process has been understood as a necessary antecedent that leads to creativity (da Costa et al., 2018), and the evidence indicates that it is an essential determinant of creativity (Farmer & Tierney, 2017). Our work is based on the componential theory of creativity (Amabile, 1996), for which Zhang and Bartol (2010) propose the creative process comprising three stages:

(a) Problem identification
(b) Search and codification of the information
(c) Generation of ideas and alternatives.

Creative process and creativity

Problem identification is the stage in which the problem must be structured and the objectives, procedures, constraints, and information to solve the problem identified (Zhang & Bartol, 2010). This includes the scanning of the environment and the identification of opportunities (Aloini & Martini, 2013). The problem to be solved must first be identified and information must then be collected and processed to advance the understanding of the identified problem (Caniëls, 2019). The thorough identification of all information pertinent to a problem allows for the development of a more accurate representation of the problem (Henker et al., 2015) and is positively related to the coding of information (Saeed et al., 2019). Based on these considerations, we propose the following hypothesis:

H1a: Proper problem identification positively affects the search and coding of information

Creative ideas do not appear fully developed in the minds of their creators but are created from the search and codification of information (Althuizen & Reichel, 2016). The time spent searching for and coding information is positively related to the quality of the solution (Saeed et al., 2019), and ideas are likely to improve (Henker et al., 2015). Devoting more time to information search activities improves originality (Illies & Reiter-Palmon, 2004) and facilitates the generation of ideas (Li & Liu, 2018). Once the information is available, alternative solutions can be generated (Lubart, 2001). Moreover, this stage leads to new ideas (Henker et al., 2015). Based on these considerations, we propose the following hypothesis:

H1b: The search and codification of information positively affects the generation of ideas and alternatives

Ideas are generated in the final stage (Caniëls, 2019), and the SME's ability to produce ideas will stimulate the generation and association of different creative results (Gundry et al., 2016). The stages of preparation and execution of creativity must be separated so that a positive impact on the innovation of the product emerges (Orzechowski et al., 2017) since the optimal solutions are achieved by refining the selected ideas and solving the details that may arise (Wang & Nickerson, 2017). Generating many ideas should be the first step in closing the gap between creativity and innovation. (Gilson & Litchfield, 2017). The generation of ideas can be a good predictor of creativity (Tan et al., 2017a). With the background presented, we propose the following hypothesis:

H1c: The generation of ideas and alternatives positively affects the creativity of the organisation

Creativity and product innovation

Creativity is essential for successful product innovation (Guo et al., 2017). A challenging task in the innovation process is to effectively transform novel and useful ideas that arise from business creativity into new products or services (An et al., 2018). The improvement of creativity in the workplace results in more innovation (Ouakouak & Ouedraogo, 2017). Successful companies learn through creativity and generate their innovations faster and more efficiently (Giampaoli et al., 2017), and creativity therefore plays an important role in the development of new products (Zocche et al., 2018). Previous studies have found a positive relationship between creativity and innovation (Ahlin et al., 2014; Baron & Tang, 2011; Sozo & Ogliari, 2019). In the light of this background, the following hypothesis is proposed:

H2: Creativity positively affects product innovation

Risk-taking

Creativity depends on the propensity of leaders to take risks (Amabile & Pratt, 2016). This stimulus encourages employees to take risks in the development of new products (Im & Nakata, 2008), and innovation will be the result of creating an environment that encourages risk-taking and experimentation (Crespell & Hansen, 2008). The relationship between creativity and innovation is not always direct. To ensure the transformation of new ideas into new products, support and resources must be provided (Ouakouak & Ouedraogo, 2017).

When there is a higher degree of freedom to make decisions and take risks, more creativity is generated (Darvishmotevali, 2019). Unusual and useful ideas are more likely to be produced when the licence to do so is granted (Gerber & Martin, 2012), and the encouragement given to teams to take risks is positively related to the novelty of the product (Castañer, 2016; Sethi & Sethi, 2009). Environments that encourage unconventional behaviour and risk propensity have more significant potential for the development of creativity (Hashi & Aralica, 2018), and a risk-tolerant culture makes it more ambitious to seek innovations (Stojcic et al., 2018).

A willingness to take risks increases the likelihood of generating and implementing creative ideas (Salvi & Bowden, 2020) and affects idea selection, as more creative ideas are perceived as riskier than less creative ones (Starkey et al., 2019). The avoidance of adverse outcomes is often combined with a fear of failure (Roskes, 2015), so risk-taking rules are crucial in supporting creativity (Ucar, 2019). SMEs that dare to take risks have the opportunity to succeed, even within their resource limitations (Games & Rendi, 2019). Both risk-taking and creativity affect innovation (Mittone et al., 2019). Therefore, we propose the following hypothesis:

H3: The relationship between creativity and product innovation is positively mediated by risk-taking.

Product Innovation and Performance

Product innovation has become a key factor for the growth of SMEs (Berends et al., 2014), as it allows them to cope effectively with the rapid evolution of technology and

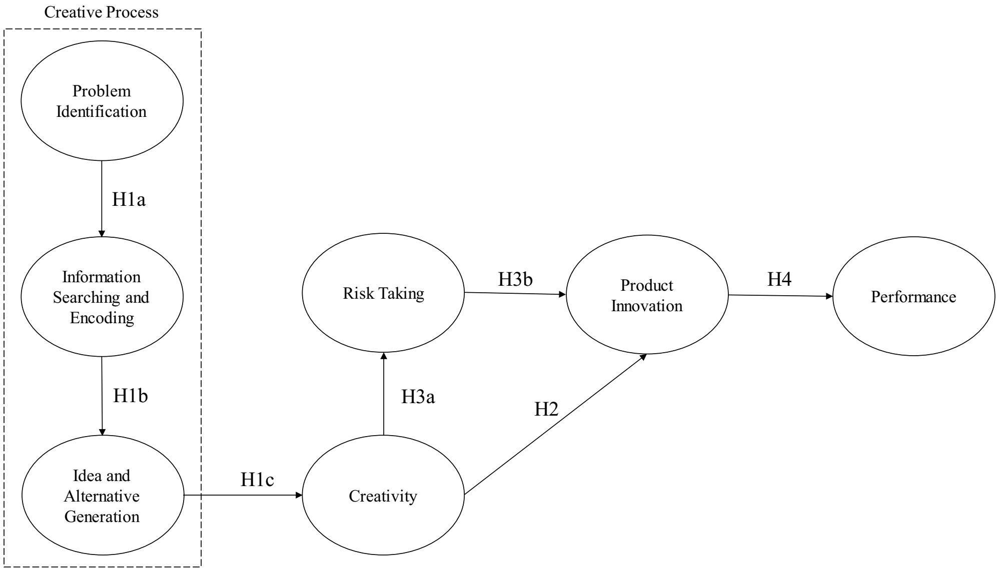

Figure 2. Proposed research model.

shorter product life cycles (Chang et al., 2015). Product innovation contributes to the renewal of the company (Danneels, 2002) and represents excellent opportunities for growth and expansion into new markets (Danneels & Kleinschmidtb, 2001). The introduction of new products facilitates the ability to respond to the needs of its customers, which implies higher performance (Sok & O'Cass, 2015). If innovation implies an improvement of the product through the replacement of obsolete products or improved quality (Meroño-Cerdán & López-Nicolás, 2017) and a reduction of costs, the company will increase its profit and its market share (Geroski & Machin, 1992). These authors suggest that innovation (at least in the short term) may have profound benefits. While these authors suggest that innovation may have profound benefits in the short term, like increased growth and efficiency, Heunks (1998) holds that these benefits are not available immediately due to the costs of innovation. Extensive empirical literature suggest a positive relationship in their analyses of product innovation and company performance (Naranjo-Valencia et al., 2016), a relationship that is particularly evident in SMEs (Saunila, 2019). Based on these arguments, we propose the following hypothesis:

H4: Product innovation positively affects performance

Figure 2 presents the theoretical model.

Methodology

Sample and data sources

The sample is composed of 139 SMEs from the manufacturing industry in northern Chile. SMEs are defined as companies with between ten and two hundred and fifty workers, corresponding to the European Commission's Oslo manual (Bagheri et al., 2019). The information was obtained from personal interviews with a self-administered questionnaire addressed to the company manager. Stratified random sampling was carried out by sector to reduce heterogeneity and minimise the risk of selection bias (Bird & Wennberg, 2016). The sample of 139 SME's was obtained from the 180 companies listed in the manufacturing sector of the 'Mercantil' business directory, a portal that publishes a list of Chilean companies' contact information according to size and region. The surveys were conducted from November 2018 to March 2019.

When preparing the questionnaire, special care was taken to minimise the bias of social convenience. Terms related to success were avoided, as recommended by Bstieler et al. (2015). In agreement with (Yang et al., 2015), we emphasised that there are no correct or incorrect answers and anonymity and strict data confidentiality were guaranteed, as suggested by Harms (2015). A preliminary test was conducted with five entrepreneurs to ensure the appropriate wording, format, and sequence of the questions (Bianchi, 2019). Around 23% of all the SMEs contacted refused to participate in our interviews. A reluctance to participate in surveys still persists in Chile, making empirical studies difficult, despite efforts to increase the response rate. This situation is not unique and the literature (Bianchi et al., 2018) indicates that the general response rate of companies is decreasing worldwide. Table 1 illustrates the sample characterisation by economic activity.

The non-response bias and variance bias of the common method were analysed to evaluate the quality of the information in the questionnaires. Late interviews were used for the non-response bias, as suggested by Nwachukwu et al. (1997). First-round responses (75%) were compared to late responses (25%). The application of t and chi-square tests revealed no significant differences between the two groups. It is known that the common method could potentially introduce bias that inflates the relationships between the variables in the investigation because the information for the dependent and independent variables were collected by the same source (Wingate et al., 2017). This bias was analysed by applying Harman's single-factor test (Podsakoff & Organ, 1986). Acknowledging the limitations of the common method, the analysis of the variance factor would reveal if all the variables are grouped into a single factor that explains a large

Table 1. Sample distribution. Sample size = 139.

Sector Industry	Number of firms	Percent of total
Construction of residential buildings	17	12.23%
Mining Services	14	10.07%
Installation of industrial machinery and equipment	12	8.63%
Manufacture of other uncategorised foods	10	7.19%
Manufacture of bread, bakery and pastry products	10	7.19%
Fabrication of metal structures	10	7.19%
Preparation of prepared foods	9	6.47%
Preparation of beverages or water packaging	9	6.47%
Manufacture of primary products of precious metals and other metals	9	6.47%
Manufacture of pumps, taps, valves, compressors, hydraulic systems	9	6.47%
Preparation and preservation of fruits, legumes and vegetables	8	5.76%
Manufacture of textile and similar clothing	6	4.32%
Manufacture of canned seafood products	6	4.32%
Publishing of newspapers, magazines, periodicals and other printing activities	5	3.60%
Furniture manufacturing	5	3.60%

amount of the variance. This analysis showed the following results: (Kaiser-Meyer-Olkin (KMO): 0.898; Bartlett Sig. 0.000 sphericity test), explaining 71.28% of the total variance. The main factor explains 26.978% of the variance, indicating that the variance bias in the common method is not an essential factor in the data.

Measures

Our questionnaire was structured to measure the creative process, creativity, risk-taking, product innovation and performance. Each of these categories included several items, as follows: The adapted scale of Zhang and Bartol (2010) was used to measure the creative process. Problem identification (2 items), information search, and coding (3 items) and idea generation (4 items). Creativity uses the scale proposed by (Brattström et al. (2012) consisting of 6 items. Risk-taking was measured using the 3 items proposed by Barringer and Bluedorn (1999). Product innovation was measured with 6 items, 4 of which were proposed by Van Auken et al. (2008) and 2 items from the Oslo manual (2005). To measure performance, 4 items proposed by (Gunday et al. (2011) were used. The study used a Likert scale of 7 points (from 1: strongly disagree to 7: strongly agree).

Data analysis

The proposed hypotheses were tested simultaneously by applying the partial least squares methods in SmartPLS© 3.2.8. (Ringle et al., 2015). This technique implies that the total variance of all constructs is used to estimate the model (Hair et al., 2017). The technique was chosen because it has the advantage of not imposing distribution assumptions for the indicators, and it does not require independency of the observations (Chin, 2010).

The application of the PLS technique consists of three steps. The first step, the model fit, applies a bootstrapping process (5,000 subsamples) and performs the bootstrap-based adjustment tests for the estimated model. The standardised root means square residual (SRMR) of well-adjusted models must be below 0.08 and is acceptable for the PLS-SEM technique (Hair et al., 2017).

The second step evaluates the measurement model by analysing the adjustment of the saturated model. In reflective compounds, the load (λ) of each constituent element must be greater than 0.707 to verify the reliability of the indicator (Hair et al., 2017). To establish the reliability of the construct, the Cronbach alpha coefficient, the composite reliability, and the Dijkstra-Henseler's indicator (RhoA) must all be higher than 0.7 (Hair et al., 2017). To establish convergent validity, these values must be greater than 0.5 (Fornell & Larcker, 1981). Furthermore, a heterotrait-monotrait (HTMT) correlation ratio below 1 proves discriminant validity (Henseler et al., 2015).

In the final step, the structural model is evaluated through measurement of the algebraic sign, magnitude, and statistical significance of the path coefficients and valuation of the coefficient of determination (R^2) (Henseler et al., 2015). (Frank and Miller (1992) proved that the R^2 values must be high enough (higher than 0.10) for the model to reach a minimum level of explanatory power. Depending on the confidence interval of the starter percentile, the path coefficient's estimates must be statistically significant, and its sign must be consistent with the hypothesis (Rasoolimanesh et al., 2019). The Stone-Geisser Q^2 coefficient is used with the blindfolding procedure to measure the predictive relevance of endogenous latent variables, as evaluation criteria value greater than zero are expected. A perfect model would have a Q^2 value equal to one (1) (Gefen et al., 2000).

Results

Within the data set, and with regard to company size, 61% of the companies have less than 50 employees, 18% have between 51 and 150 employees, and 21% of the companies have more than 150 employees. As for the age of the companies', 7% are under 2 years old, 12% are between 2 and 5 years old, 30% are between 6 and 10 years old, and the rest are older than 10 years. Regarding the age of the organisation's manager, managers are under 40 years of age in 30% of the companies, and over 40 years of age in the remaining 70% of companies.

As previously indicated, the PLS technique consists of three steps, the first step, the model adjustment. The test for the overall fit of the model was not rejected, (dG = 0.688, dG <95%) and (dULS = 1.452, dULS <95%), while the SRMR value for the estimated model is (SRMR = 0.076, SRMR <95%) below the 0.08 suggested by (Henseler et al., 2016). The second step evaluates the outer model and the third step inner model. The results are presented below.

Outer model

The model meets all the established requirements. The SRMR value of the saturated model was 0.06, below the 0.08 suggested by Hu and Bentler (1999), providing empirical evidence for the operationalised constructs. The load (λ) of each element in the model's construction (Table 2) must be greater than 0.707 to verify the reliability of the indicator, and the indicator of the 'product innovation' construct is below the parameter. The element (0.641) was retained to maintain the indicators of the original measures (Martelo-Landroguez et al., 2019). The model meets the construct reliability requirement, as the Dijkstra-Henseler's indicator (ρ), as well as Cronbach's Alpha coefficient and composite reliability all exceed 0.7 (Table 2). The values for the AVE (Table 2) are above the threshold of 0.5 and convergent validity is achieved. Finally, all variables reach discriminant validity, given that the Fornell-Larcker criterion is satisfactorily met, and the bootstrap-based confidence interval for the HTMT value (Table 2) meets the threshold value.

Table 2. Reliability, convergent validity and discriminant validity values of outer model.

Construct	Alpha de Cronbach	rho_A	Composite Reliability	AVE	HTMT (PI)	(IS)	(IG)	(C)	(RT)	(I)	(P)
Problem identification (PI)	0.707	0.714	0.872	0.773							
Information searching and encoding (IS)	0.887	0.887	0.930	0.816	0.819						
Idea generation (IG)	0.922	0.922	0.872	0.810	0.813	0.870					
Creativity (C)	0.899	0.909	0.922	0.664	0.770	0.724	0.726				
Risk Taking (RT)	0.713	0.717	0.840	0.636	0.456	0.347	0.449	0.402			
Product Innovation (I)	0.851	0.862	0.890	0.575	0.344	0.218	0.243	0.401	0.613		
Performance (P)	0.904	0.906	0.933	0.777	0.366	0.281	0.334	0.407	0.504	0.795	

Table 3. Constructs effects on endogenous variables (included lower and upper bounds of 95% confidence interval).

Hypotheses	Patch Coef.	p-value	Confidence intervals 95%CIli	95%CIhi	Supported
H1a: Problem Identification→Information Searching	0.811	0.000	0.715	0.868	Yes
H1b: Information Searching→Idea Generation	0.880	0.000	0.822	0.912	Yes
H1c: Idea Generation→Creativity	0.755	0.000	0.667	0.806	Yes
H2: Creativity→Product Innovation	0.188	0.058	−0.036	0.361	No
H3a: Creativity→Risk Taking	0.317	0.000	0.114	0.413	Yes
H3b: Risk Taking→Product Innovation	0.425	0.000	0.223	0.556	Yes
H4: Product Innovation→Performance	0.730	0.000	0.611	0.778	Yes

Note: one-tailed test was used by testing hypotheses through percentile confidence intervals.

Inner model

Hayes and Scharkow (2013) showed that the bootstrap confidence interval is the right approach for detecting path coefficients. The trajectory coefficients were found to be compatible in all cases, except for 'creativity' in product innovation. Table 3 shows bootstraps with a 95% confidence interval. Figure 3 shows the structural model and the results: this model explains 53.3% of the companies' performance variation.

The mediating role of the risk-taking variable was analysed, determining the importance of the type of mediation and the indirect effect thereof. The results are presented in Table 4. PLS bootstrapping results for the combination of the path a (Creativity to Risk-Taking) and path b (Risk Taking to Product Innovation) were considered to test the significance of the indirect effect. The direct effect (Creativity to Product Innovation) was insignificant, but the indirect effect was significant, indicating mediation (Nitzl et al., 2016). The indirect effect of risk-taking is around 42%, according to the Variance Accounted For (VAF) value (Hair et al., 2017).

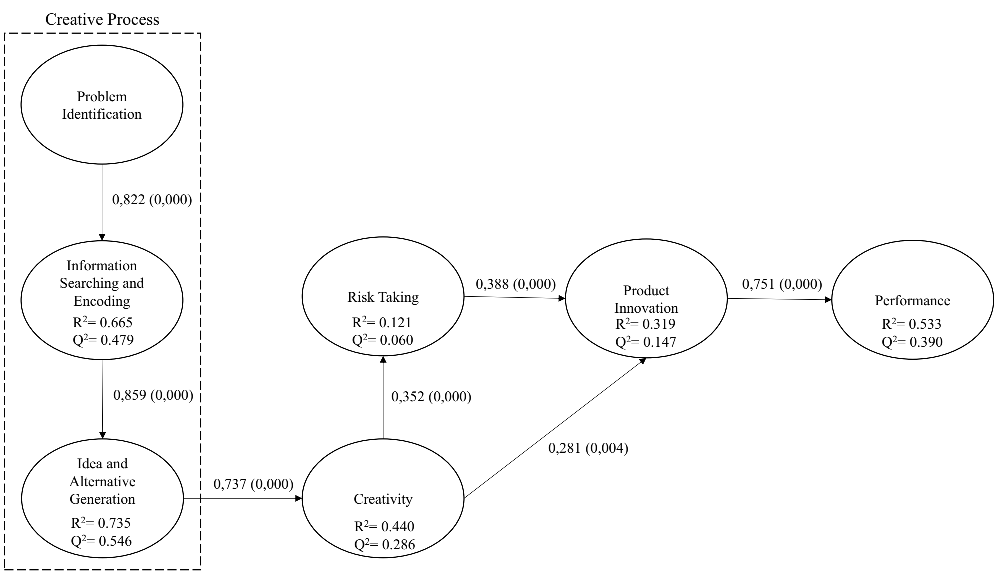

Figure 3. Structural model (main model) and results.

Table 4. VAF variance accountant for, C creativity, RT risk taking, I product innovation p <.001 (based on t (4999), one-tailed test).

		Percentile				
Direct effects	Coefficient	Lower (2,5%)	Upper (95%)		VAF	t-value
c′ (C→I)	0.188	−0.009	0.389	No sig.		1.573
a (C→RT)	0.317	0.216	0.482	Sig.		3.869
b (RT → I)	0.425	0.263	0.584	Sig.		4.320
Indirect effects	Point estimate					
a*b	0.135	0.078	0.237		42%	

Discussion

SMEs can be creative but, when probing for an explanation for achieving creative results, it is often found to be a random process, in which each idea has the same probability of being novel and useful. A deliberate focus on the creative process establishes intentional environments for creative outcomes to occur. The theoretical background of Zhang and Bartol (2010) shows that a linear process leads to creative outcomes, and is not random. Our results support this position; the stages of the creative process each have a direct and positive effect on the next stage.

The SME that manages to structure the problem and establish the objectives, restrictions, limits, and available information, will successfully advance the understanding of the identified problem to obtain an accurate representation thereof. These activities will improve the search for information to solve the problem, and are very relevant since accessing more knowledge is an essential precondition for the generation of more ideas. Access to a variety of solutions, examples and information about the problem improves the likelihood of making connections that could lead to ideas.

The stages of problem identification and information searching must be separated for the process to have a positive impact (Orzechowski et al., 2017). Access to information is a condition that increases the generation of original ideas (Simonton, 1999). The greater the number of options available at idea generation stage, the higher the number of potentially new and useful ideas that will be generated to select from. An understanding of the creative process can improve creativity in SMEs by motivating participation at every stage of the creative process. A structured approach to the search and codification of information, will also result in more new and useful ideas (Wimmer, 2016).

A difficult task for SMEs is to transform novel and useful ideas into innovations. A company that supports active participation in the creative process will have a more significant number of new and useful ideas that it can transform into innovations (Cheng & Yang, 2019), and ideation is a crucial ability to improve product innovation performance. However, our study did not show a significant direct relationship between creativity and innovation. Our results mirror those obtained by Sohn and Jung (2010), who studied Korean companies and concluded that creativity has no direct influence on innovation. There are two possible explanations for this result. First, despite the existence of public innovation support programs, Chilean SMEs face challenges such as low human capital and a lack of innovative culture (Naqeeb, 2016), preventing SMEs from converting creativity into innovation. Second, Chilean SMEs work in the context of individualism, which harms innovation (Rosenbusch et al., 2011).

Our results also show the effect of risk-taking in mediating the conversion of creativity into innovation. These results are significant because they point to the need to foster a culture that encourages abandoning existing solutions, trying alternatives, taking risks and a preparedness to fail. A risk-tolerant culture allows SMEs to be more ambitious in generating innovation. SMEs with working environments that support creativity introduce more new products to the market and are more successful in terms of sales of new products.

Finally, we provide evidence of the positive effect of product innovation on the performance of SMEs. This result verifies the established literature that demonstrate that product innovation plays a crucial role in the competitiveness of SMEs (Naranjo-Valencia et al., 2016; Toigo, 2016). SMEs which innovate seek to meet the demands and needs of the market, especially those of their customers (Alipour & Karimi, 2011) and obtain competitive advantages due to increased demand, higher revenues, more customers and increased market share (McNally et al., 2010).

Conclusions

Our study considers an integral model of creativity and innovation for SMEs, considering the stages of the creative process, the role of risk-taking, and the effects on the company's innovation and performance. The results reveal that the attitude towards risk-taking in Chilean SMEs is the most critical factor that promotes product innovation, and that this risk appetite acts as a mediator between the development of creativity and innovation. Additionally, with this study, we have seen the importance of the proper execution of each of the stages of the creative process for the development of creativity. Finally, product innovation has a positive impact on the performance of SMEs.

The results are useful for SME managers, giving them a comprehensive view of the creative process in their organisations. It allows managers to understand the importance of problem identification in the accurate representation of the problem to be addressed. Similarly, the structured search and codification of information related to the identified problem, will facilitate the generation of ideas. It improves the managerial understanding of the importance of significant efforts in problem identification, information gathering and the generation of numerous ideas and alternatives to produce new and useful solutions (Zhang & Bartol, 2010). Another important implication is the mediating effect of risk-taking between creativity and innovation. The results of this study provides management with a clear impetus to take risks in order to produce novel and useful ideas. Managers with an appetite for risk will encourage their workers to take risks in the development of new products.

In terms of public policy implications, this study could be relevant to inform policies that stimulate creativity in innovation systems. It is crucial that the administration promotes programs that generate innovation networks and specialised programs in the formation of the creative process. The search for information positively affects the generation of ideas. However, SMEs have difficulties in obtaining information. It is therefore necessary to create platforms that enable access to information and collaboration among SMEs (Gabriel et al., 2016). Cloud Computing is proving to be an exciting opportunity for SMEs in this respect (Gay & Szostak, 2019). In this sense, the collaboration between the administration and universities can play a fundamental role.

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No potential conflict of interest was reported by the authors

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