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Habilidades que influyen en los niveles de innovación en una organización

Skills that influence the levels of innovation in an organization

Habilidades que influenciam os níveis de inovação em uma organização

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Resumen

Las empresas están siendo sujetas de mayores niveles de incertidumbre, los cambios son constantes y los clientes demandan nuevas y más rápidas soluciones sobre sus necesidades. Por eso, el objetivo de la investigación es determinar si el nivel de madurez de la innovación bajo las variables de adaptabilidad, aprendizaje, colaboración, creatividad y recursos clave son elementos que determinan el nivel de desempeño de la innovación, con alcance de aplicación en los negocios latinoamericanos en Guatemala y México. Como método de investigación se utilizó la entrevista de expertos con validación de Lawshe modificado, con 0.95 de coeficiente de concordancia. La muestra fue no probabilística por conveniencia de 101 personas. El cuestionario para determinar las prácticas de innovación fue validado con 0.958 en la fiabilidad del coeficiente alfa de Cronbach. Asimismo, se aplicó la prueba de Kruskal-Wallis H para probar que las variables *madurez* e *innovación* tienen una relación. Aunado a ello, se aplicó la correlación de Spearman con 0.846 y nivel de significancia del 0.000, por lo que se concluye que el nivel de madurez en las prácticas de innovación determina el desempeño.

Palabras clave: adaptabilidad, aprendizaje, colaboración, creatividad, recursos, madurez.

Ricea
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Abstract

Companies are being subject to higher levels of uncertainty; changes are constant, and customers demand new and quick solutions to their needs with expectations of a faster solution. The objective of the research is to determine if the level of maturity of innovation under variables of adaptability, learning, collaboration, creativity and key resources determines the level of performance of the innovation, with scope of application in Latin American business in Guatemala and Mexico. As a research method, the expert interview with Modified Lawshe validation was used with a coefficient of agreement of 0.95, a non-probabilistic convenience sample of 101 people, a questionnaire to determine innovation practices, and it was validated with 0.958 in the reliability of the Alpha Coefficient Cronbach´s test, Kruskal-Wallis H test was applied to validate variable Mature and innovation are related, additionally the Spearman evaluation test was applied with 0.846 and a significance level 0.000, concluding that level of maturity innovation practices determines the level of performance in innovation.

Keywords: adaptability, learning, collaboration, creativity, resources, maturity.

Resumo

As empresas estão sujeitas a níveis de incerteza mais elevados, as mudanças são constantes e os clientes exigem soluções novas e mais rápidas para as suas necessidades. Portanto, o objetivo da pesquisa é determinar se o nível de maturidade da inovação sob as variáveis de adaptabilidade, aprendizagem, colaboração, criatividade e recursos-chave são elementos que determinam o nível de desempenho da inovação, com escopo de aplicação no Negócios latino-americanos na Guatemala e no México. Como método de pesquisa utilizou-se a entrevista com especialistas com validação Lawshe modificada, com coeficiente de concordância de 0,95. A amostra foi não probabilística por conveniência de 101 pessoas. O questionário para determinação de práticas de inovação foi validado com confiabilidade de 0,958 do coeficiente alfa de Cronbach. Da mesma forma, foi aplicado o teste H de Kruskal-Wallis para comprovar que as variáveis maturidade e inovação possuem relação. Além disso, foi aplicada a correlação de Spearman com 0,846 e nível de significância de 0,000, portanto conclui-se que o nível de maturidade nas práticas de inovação determina o desempenho.

Palavras-chave: adaptabilidade, aprendizagem, colaboração, criatividade, recursos, maturidade.

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Introduction

Since the mid-20th century, Schumpeter (1942) emerged with the theory of economic development based on innovation and technology. Then, at the end of the 20th century, in the information age and in a more globalized world, Clayton Christensen (2000) proposes approaches focused on innovation. For his part, Demircioglu *et al.* (2019) present outstanding proposals. For example, through the SUR regression model, they identify unrelated relationships with a value of $P < 0.001$ and $B = 0.06$, which suggests that innovation in a business can originate to develop new products, processes and marketing strategies *with* $B = 0.05$. Furthermore, they point out that the sources that generate innovation include suppliers, clients, workers and universities.

On the other hand, some authors have identified variables that generate innovation, such as commitment and organizational learning (Sun *et al.* , 2021). Ferraris (2022), using linear regression based on the least squares model with an R^2 of 0.31, states that innovation performance is determined by the breadth and depth of the search for innovation. Likewise, An *et al.* (2018) highlight that organizations with greater innovation are those that exhibit greater creativity and a greater focus on bricolage, a process in which innovation is materialized.

According to other studies, it is estimated that the importance of product innovation could experience a slight decrease in the medium term. However, an increase in the relevance of innovation in services, processes and business models is forecast, although the evolution of *marketing innovations* still presents uncertainty for the future.

Even so, in recent years, there has been a significant increase in the importance of innovation in business models (13.25%), processes (10.1%), services (9.5%), while product innovation has experienced a slight reduction of 0.2% (Dagmar, 2018).

Among previous research, the work of Cutipa-Limache *et al. stands out.* (2022), which presents an R^2 correlation of 0.967. However, limitations are noted in the sample size, which is comparatively small in relation to other quantitative studies. Furthermore, the research focuses exclusively on micro and small companies exporting textile crafts in Southern Peru, which suggests the need to expand the sample to other productive sectors to support broader generalizations at the national level. In this regard, Reck *et al.* (2022) highlight the importance of portfolio and relationship management as crucial elements for network and knowledge management in innovation.

Cutipa-Limache *et al.* (2022) point out that human, organizational and technical innovation are the key drivers of innovation. However, it is observed that the constructs are quite general and

do not allow identifying specific areas that contribute to the understanding of the generators of innovation.

Sun *et al.* (2021) propose capabilities such as organizational commitment (r=0.612), learning (r=0.771) and environmental dynamics as crucial elements for performance in innovation, although it should be noted that the aspect of commitment is not considered in the present research. as part of the variables evaluated.

In the literature review, the scarcity of studies carried out in Peru stands out, since the majority of the research reviewed comes from the United States, Asia and Europe. This underlines the relevance and opportunity of the present study to contribute to knowledge in the Latin American context. Furthermore, it is highlighted that this work addresses constructs oriented to skills and capabilities that individuals or organizations can develop to improve their levels of innovation, unlike other publications that identify factors not linked to specific skills.

Having noted all of the above, the proposed research presents a valuable contribution to the scientific, academic, business community and, especially, to the community of entrepreneurs, by facilitating the identification of relevant factors to achieve high levels of innovation. The proposal of a model that allows us to discern the elements that contribute to innovation will be of great importance for the scientific and academic community that seeks an understandable and replicable framework in the academic field. Likewise, it is expected that in the scientific field this model can be improved and perfected. Therefore, the hypothesis to be tested maintains that the maturity processes of an organization constitute the independent variable that determines the level of innovation, a connection that will be explored and supported throughout the study.

In this sense, the implementation of a simplified model will allow entrepreneurs, businessmen and managers to easily identify the crucial variables to achieve higher levels of innovation. By discovering the factors that show a significant correlation with innovation, it is easier to determine the elements that generate the most successful results.

The central objective of the research is to demonstrate the existence of a relationship between the *maturity construct* , which refers to the practices and behaviors in a company, and the level of innovation that the company manages to achieve. The hypothesis states that maturity, which encompasses determining variables for innovation, is associated with key factors such as resource management, adaptability, creativity in problem solving, and learning and collaboration, all elements that are presumed to favor the increase in innovation.

H0 = The level of innovation is not determined by the variables of resource management, adaptability, creativity to solve problems and learning and collaboration.

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H1 = The level of innovation is determined by the variables of resource management, adaptability, creativity to solve problems and learning and collaboration.

Theoretical framework

The levels of maturity in innovation and the factors that determine the level at the organizational level

Maturity models are used to outline levels or stages that describe the development of an object of analysis in a simplified way. These stages should be sequential and represent a hierarchy, where the lowest level is generally characterized by the complete absence of innovation, while the highest level is based on continuous improvement and innovation management processes (Inków , 2019). . The main objective is to describe the ways to achieve innovation in a logical manner, as well as the relationships between the different stages.

In this sense, the most common objectives of maturity models include descriptive, prescriptive and comparative. Its descriptive function lies in representing activities, its prescriptive purpose lies in providing information about how the organization will achieve future levels of maturity, and its comparative purpose seeks to identify differences with respect to the practices of other organizations (Inków , 2019).

Adaptability

Bustinza *et al.* (2019) propose that innovation performance is determined by the connection between product development efforts and commitment to customers, as well as the organization's service provision. This suggests that a customer-centric company must develop relationships that integrate both customers and suppliers.

Creative problem solving

Creative problem solving is directly linked to the skill of the people within the organization. In accordance with this concept, Cutipa-Limache *et al.* (2022) identify the theory that the level of innovation is generated from three factors: human innovation, organizational innovation, and technical innovation. In an innovative culture, it is crucial to foster staff commitment to change and innovation, promote creativity, and take moderate risks with a mindset of flexibility for innovation (Cutipa-Limache *et al.* , 2022). Furthermore, organizational capacity and the

environment are essential to transform human resources and achieve a competitive advantage, and emotional capacity is vital to drive a dynamic in human resource practices (Sun *et al* ., 2022).

Learning and collaboration

Knowledge management, intellectual capital, organizational capabilities, and as a prerequisite point, organizational culture, are crucial elements for the study, although a direct relationship between organizational culture and the level of innovation is not identified. The learning and collaboration factor encompasses aspects both internal to the individual and interaction with limited resources in the company. Thus, bricolage allows organizations to combine and reuse available resources to fill gaps and address new problems and objectives. Its application during the idea generation stage is especially beneficial, contributing significantly to the idea generation implementation process (An *et al.* , 2018).

Cooperation, technological orientation and long-term customer focus are key factors that must be considered to achieve better performance (Demircioglu *et al.* , 2019). The expansion of the company's network should be seen as an organizational change process that involves innovation, voluntary collaboration, and sharing of knowledge and experiences, which provides employees with the freedom to address problems related to knowledge transfer (Reck *et al* ., 2022). When a centralized network with complementary knowledge, adequate portfolio management and effective relationships is achieved, optimal conditions are created to improve innovation (Reck *et al.* , 2022).

Collaboration enhances the positive impact of innovation in products and services, management systems, *marketing* , strategy and performance measurement. However, it is important to distinguish that, although product innovation is linked to technological innovation, service innovation is not necessarily associated with digital technology (Bustinza *et al.* , 2019).

Knowledge management has gained increasing importance in achieving various types of innovation, given its impact on the generation of competitive advantages and organizational performance. In this sense, the storage and interpretation of data, empowerment, promotion of innovative development, interaction, speed, technological infrastructure and personalized access to information are crucial elements to achieve objectives and unleash creativity and innovation.

Therefore, it is essential that managers incorporate emotional aspects into human resources systems to foster an environment tolerant of failures and errors, which is achieved by recruiting personnel based on values and promoting a culture of expression of opinions. Emotional capacity,

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in this context, generates positive results in organizational learning, the latter being a significant contributor to innovation. Human resources, for their part, offer an absorption capacity that facilitates the identification of external knowledge through interaction with actors or participants in the market. Likewise, organizational culture and knowledge have the most significant impact on the generation of innovation and organizational learning (Sun *et al.* , 2022).

Resource management

In organizations where significant investments are made in research and development (R&D), it is common to observe the reconfiguration of new phases in the product life cycle. This phenomenon is due to technological disruptions, uncertainty, product variations, and continued investments in product innovation. Cost and financing barriers encompass a lack of both internal and external resources, as well as the high costs associated with innovation. However, organizations, especially small businesses, often face R&D budget constraints, making it difficult to acquire new technologies, while large corporations, thanks to their economies of scale, can access financing more easily. The latter, in fact, usually have an advantage by having a greater availability of personnel, which allows them to address innovation challenges more effectively.

Innovation levels

Studies indicate that there is a significant correlation between the reduction or stagnation in a company's performance and the high costs associated with product or process development. Although product development requires fixed capital investment, it also offers opportunities to develop economies of scale, demonstrating the need to increase collaboration in this process (Bustinza *et al.* , 2019).

The innovation process, whether formalized or not, constitutes the core of innovation activities, spanning from ideation to market launch. However, success in this area lies in an efficient design of innovation processes. Implementing continuous evaluations and process adjustments is essential to prevent problems and be prepared for long-term changes in customer needs, markets, and the organizational environment. According to Dagmar (2018), a model of maturity levels can be observed that evolves from a customer orientation at level 1, then extends to the environment at level 2, focuses on strategy at level 3 and, finally , at level 4 we seek to define the future through an innovation system.

In the customer-centric approach, the company must transcend the integration of products and services and adopt a relational perspective sustained by the customer. Cutipa-Limache *et al.* (2022) propose four levels of innovation from the business perspective, ranging from the strategic to the operational level: level 1, innovation in the business model; level 2, process innovation; level 3, innovation in markets; and level 4, product innovation.

Description of the study

Methods and techniques

An evaluation was carried out through the participation of five experts in the area of business innovation, who contributed to defining the variables to be measured in the questionnaire and offered valuable suggestions on the interpretation of the questions. The evaluation was carried out using Google Forms, and the coherence of the instrument was determined using the modified Lawshe evaluation method . After debugging the questionnaire, the final version of the instrument was established for the application of surveys through Google Forms, with an estimated time of approximately 10 minutes per respondent.

The study was carried out in Guatemala and Mexico during the months of March and April 2023. The data were subsequently analyzed with the SPSS tool. A descriptive statistical analysis was used to identify relevant characteristics of each item evaluated, followed by a Cronbach's alpha analysis to evaluate the internal consistency of the questionnaire.

The subject of the study had to have a profile that corresponded to a person with a master's degree in business, with work experience in various industries in Guatemala and Mexico. Given this specific profile, random sampling was not applied, since subjects could not be selected completely randomly and resources were limited. The sample was selected non-probabilistically for convenience, with the condition that the participants had a master's degree in business, either as employees or entrepreneurs. The final sample consisted of 101 subjects.

83% of respondents had between one and five years of experience in business innovation, while the remaining 17% had more than five years of experience. Regarding the size of the companies in which they worked, a diverse distribution was observed, with 10.9% in micro companies, 23.8% in small companies, 22.8% in medium-sized companies, 19.8% in large companies, 15.8% in multinationals and 6.9% in global companies. The unit of analysis encompassed individuals working in companies of various sizes. In terms of job roles, 50% had a

middle management position, 27.7% were at an operational level, 10% held management positions, and 12% were business owners.

Instrument

A questionnaire was developed consisting of a total of 71 items, where participants expressed their responses using a Likert scale, which included the options “Totally agree”, “Agree”, “Neutral”, “Disagree” and “Totally agree”. in disagreement". These responses reflected the perception of the respondents in relation to the practices carried out in the company where they currently work.

The independent variable in this study was *maturity level* , understood as the practices that an organization implements to activate the facilitating elements related to adaptability, learning, collaboration, creative problem solving and resource management.

On the other hand, the dependent variable in this study was *level of innovation* . This is defined based on the elements that an organization uses to launch products, services, processes, management systems and business models with the ultimate objective of generating a desired financial performance within the organization. Table 1 provides a breakdown of the constructs related to these variables.

Table 1. Variables

Independent variables	Dependent variables
• Adaptability • Learning and collaboration • Creative problem solving • Resource management	• Financial performance • Provision for introduction of new products or services • Provision for introduction of new processes • Willingness to implement new management systems • Search for new business models

Source: self made

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Procedure

To develop a valid measurement instrument, it was proposed that a group of expert peers review the questionnaire. For this purpose, the modified Lawshe content validity index test was used , since the five experts were selected for their experience and mastery of the topic investigated. Therefore, the appropriate content validity test was the modified version of Lawshe (Tristán, 2008). This approach facilitated the construction of the measurement instrument and allowed the expert peers to evaluate whether the questions and their formulation reflected a consensus among them or, on the contrary, whether there was inconsistency in their opinions regarding the questions. An average coefficient of 0.95 was determined, which means a high agreement between the experts. Likewise, two items were identified with a value of 0.83, which were eliminated because they turned out to be duplicates.

Once the instrument was validated by the group of expert peers, and considering that the sample had to be non-parametric with a total of 101 respondents, after data collection, the variables were coded for conversion to a numerical base, so that were processed in SPSS. Subsequently, a review of atypical cases was carried out, although none were found that required discarding. To evaluate reliability, Cronbach's alpha test was applied, which was accepted, given that the values exceeded the threshold of 0.70; The result of 0.958 reflects robust consistency in the results.

Next, a descriptive statistical analysis was carried out to identify frequencies and relevant cases. The non-parametric test for non-normal data was carried out using the Spearman correlation coefficient test, being allowed because the sample consisted of 101 elements, exceeding the required minimum of 50. For the hypothesis test of the nominal variables , the chi square test was used, crossing each dependent variable with the independent ones. The criteria to determine the acceptance of the null hypothesis were the degrees of freedom and significance less than 0.05, guiding the evaluation of which variables accepted or rejected the null hypothesis.

Hypothesis testing

Null hypothesis: there is no correlation between the maturity of the organization and the level of innovation.

Table 2 shows the results of the correlation, since the result is 0.846, it is a high correlation, then the null hypothesis is rejected.

Because the significance is 0.000, then the null hypothesis is rejected because the null hypothesis could only be accepted if the result was greater than 0.05.

Table 2. Correlation of the *innovation* and *maturity constructs*

			MATURITY	INNOVATION
Spearman's rho	MATURITY	Correlation coefficient	1,000	.846
		Sig. (2-tailed)	.	,000
		N	101	101
	INNOVATION	Correlation coefficient	.846 **	1,000
		Sig. (2-tailed)	,000	.
		N	101	101
Source: self made				

Table 3. Correlation of innovation maturity constructs and innovation level construct

			INNOVATION	Learning and collaboration	Adaptability	creative problem solving	Resource management
Spearman's rho	INNOVATION	Correlation Coefficient	1,000	.616	.744	.752	.815
		Sig. (2-tailed)	.	,000	,000	,000	,000
		N	101	101	101	101	101

Source: self made

According to the analysis of Table 3, it is observed that the construct *learning from the environment* is the one that has the lowest correlation with the *innovation performance variable* .

Regarding the dependent variables, within the *maturity construct* , it stands out that the willingness to create products shows the highest correlation, with a value of 0.836. Next, the willingness to process has a correlation of 0.771, followed by the willingness to implement management systems with 0.715. The variable with the lowest correlation, although still considered acceptable at the level of maturity related to the search for creating business models, reaches a value of 0.64.

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To validate the hypothesis test, the non-parametric statistical test is used. A new variable (*maturity*) was created , which acts as an independent variable, representing the average of the results of the independent variables. Likewise, the same approach was applied to the *innovation variable* , which averages the dependent variables. Using SPSS, the Kruskal-Wallis correlation coefficient H, shown in Table 4, was calculated exclusively for the hypothesis testing of the constructs.

Table 4. Kruskal-Wallis H correlation coefficient

	MATURITY	INNOVATION
Kruskal-Wallis H	18,631	18,346
df	5	5
Asymp . Next.	.002	.003

Source: self made

Considering their significance, both constructs are independent and were selected at random. However, for ordinal variables, the Kruskal-Wallis test for non-parametric statistics indicates that both variables exhibit similar behavior. With five degrees of freedom and a probability of 0.05, the Z value is 1.6103. Since the H values are 18.34 and 18.63, in both cases the null hypothesis is rejected. Therefore, the alternative hypothesis is accepted and it is confirmed that the level of process maturity determines the level of innovation in a company.

Hypothesis testing for nominal variables (chi square)

In the first case, with 24 degrees of freedom and 5% confidence, the minimum value is 36.415 and the calculated chi square is 53.439. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, which establishes a relationship between years of experience in innovation and the willingness to implement new processes.

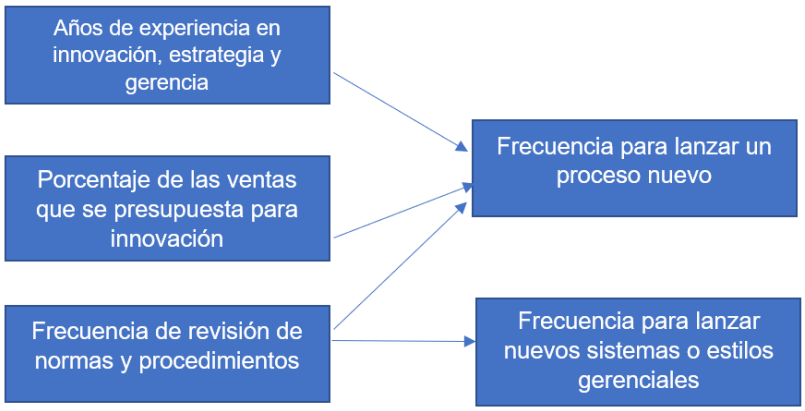
In the second case, with 30 degrees of freedom and 5% confidence, the minimum value is 43.773 and the calculated chi square is 45.542. In this case, the null hypothesis is also rejected, and the alternative hypothesis is accepted, which indicates a relationship between the variables of the perception dedicated to innovation on gross sales and the frequency of launching new processes.

In the third case, with 24 degrees of freedom and 5% confidence, the minimum value is 35.415 and the calculated chi square is 43.421. The null hypothesis is rejected, and the alternative hypothesis is accepted, which maintains a relationship between the frequency with which standards

and procedures are reviewed and the frequency with which new processes are launched in the company.

In the fourth case, also with 24 degrees of freedom and 5% confidence, the minimum value is 35.415 and the calculated chi square is 38.424. The null hypothesis is rejected, and the alternative hypothesis is accepted, which establishes a relationship between the frequency with which standards and procedures are reviewed and the frequency with which management systems or styles are launched in the company.

Figure 1. List of nominal variables



Source: self made

Figure 1 identifies the relationship between the variables of years of experience, percentage of sales and the frequency with which they review their procedures with an effect on the frequency with which they launch new processes, while the frequency with which they launch New systems or management styles only have a relationship with the frequency of review of standards and procedures.

Discussion of results

The results show that there is a significant correlation between practices and organizational maturity with the level of innovation in companies. When examining the correlations between individual variables, agreement is observed with the conclusions of various authors and the findings of this research.

Inków (2019) highlights the importance of innovation maturity models, and the present study supports this statement by identifying a substantial correlation (correlation coefficient of

0.846) between the level of maturity and the level of innovation. This confirms the relevance of maturity levels in the context of organizational innovation.

Bustinza *et al.* (2019) highlight the relevance of knowledge management and collaboration to foster innovation. In line with this perspective, current research finds that the *learning and collaboration factor* has a correlation coefficient of 0.616, which validates the idea that the learning capacity and collaboration between individuals are crucial aspects to drive innovation in a company. .

Rek *et al.* (2022) highlight the importance of portfolio and relationship management. In this study, it is observed that the *resource management factor* exhibits a significant correlation coefficient of 0.815 with the level of innovation. This factor not only facilitates network and knowledge management (learning and collaboration), as mentioned above with a coefficient of 0.616, but also highlights the additional importance of human resources and the time allocated to promote activities that generate innovation, in contrast to Reck 's perspective *et al.* (2022).

Yang *et al.* (2021) highlight the importance of networks to strengthen innovation, and although they indicate that centralized networks improve innovation performance, the present research reveals a correlation coefficient of 0.744 for the *environmental adaptability factor* .

Walrave *et al.* (2018) explain the relevance that the generation of innovation does not depend solely on internal aspects of the organization, but that ecosystems also play a crucial role. Furthermore, Demircioglu *et al.* (2019) reinforce the idea that various elements of the environment, such as suppliers, customers, industry, universities, and workers, contribute significantly to the level of innovation. Sun *et al* . (2021) propose emotional, learning and environmental dynamics capabilities as elements that influence innovation. This finding is reflected in the results of the data analysis, confirming the coefficient of 0.616 identified in the *learning and collaboration factor* , which evaluates elements of the environment. However, the present research does not address emotional aspects, since they were not within the scope of the study.

In contrast, Cutipa-Limache *et al.* (2022) find that human, organizational and technical innovation are the elements that generate the level of innovation. However, he points out that these constructs are quite general and do not allow identifying specific areas that facilitate the understanding of the drivers of innovation.

Ferraris *et al* . (2022) maintain that to carry out incremental innovations it is necessary to expand the network and the environment to obtain improvements in products or processes. However, to achieve disruptive innovations, deeper research is required, since this allows totally

different solutions to be identified. These findings are related to the *adaptability factor* , where a correlation coefficient of 0.744 was observed.

Regarding creative problem solving, where a coefficient of 0.752 is identified to achieve a high level of innovation, Barnard and Herbst (2019) support this element by identifying that creativity arises when both parts of the brain are involved.

The analysis of the Kruskal-Wallis H test confirms the relationship between the *maturity* and *innovation variables* . Furthermore, the Spearman correlation coefficient test reveals that the independent variables have a greater correlation with the variables associated with products, processes and management systems, but present a lower level of correlation with the creation of business models and financial performance.

C onclusions

This work shows that in recent years efforts have been made to identify the factors that influence the levels of innovation in a company or organization. Different perspectives that can influence these levels were identified, taking as a starting point the elements of adaptability, resource management, creative problem solving and learning and collaboration. The hypothesis that these four factors affect the levels of innovation in an organization was confirmed. Furthermore, it was found that the factors that influence innovation in countries in Europe, Asia or the United States are the same as those that affect Latin America, specifically in Guatemala and Mexico.

Through the Kruskal-Wallis H analysis, a relationship was found between the constructs *maturity* and *innovation* . Likewise, through the Spearman correlation, it was determined that there is a greater correlation with innovation to generate products, services or new processes. However, the correlation is weaker for generating new business models, with a coefficient of 0.64.

Future lines of investigation

For future research, it is suggested to examine the business models factor more specifically to identify particular aspects that can drive innovation in this area. Likewise, the application of studies using structural equations is recommended to better understand how the different factors are related, going beyond the conception of dependent and independent variables.

Furthermore, the scope of the study could be expanded by incorporating aspects such as organizational culture, emotions, work environment and ethics, to obtain a more complete understanding of the elements that influence levels of innovation.

Given the rapid evolution of the uses of artificial intelligence, it would be interesting to explore how it can contribute to and promote innovation in organizations. Finally, it is suggested to include a prospective variable that measures the impact of the level of innovation on competitiveness, using methods such as structural equation analysis.

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Appendix

Questionnaire Elaborated in Google Forms

POSDOC - Cuestionario para medir el nivel de innovación

El presente cuestionario está elaborado con la finalidad de conocer la percepción de las personas en el ambito de la innovación y la estrategia de negocios y que puedan aportar en la investigación posdoctoral sobre el nivel de innovación.
Es importante aclarar que las respuestas no serán consideradas como correctas o incorrectas debido a que son con fines estadisticos.
Los resultados serán manejados de manera anonima.

Objetivo de la investigación
Identificar la relación entre las variables que generan la innovación y su efecto en términos de desempeño y nivel de madurez de la innovación en la empresa.

* Indica que la pregunta es obligatoria

Datos de identificación

1. Nacionalidad *

Marca solo un óvalo.

- ◯ Guatemalteca
- ◯ Mexicana
- ◯ Otro

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2. Indicar cuantos años de experiencia tiene en el tema de la innovación, estrategia y gerencia *

Marca solo un óvalo.

- de 1 a 3 años
- De 3 a 5 años
- Entre 5 y 10 años
- Entre 10 y 15 años
- Mas de 15 años

3. Tamaño de la empresa *

Marca solo un óvalo.

- Empresa global
- Empresa multinacional
- Empresa grande
- Empresa mediana
- Pequeña Empresa
- Micro Empresa

4. Puesto *

Marca solo un óvalo.

- Dueño de empresa
- Director o Gerente
- Mando medio (jefe, supervisor, coordinador)
- Operativo

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8. En qué grado te identificas con las siguientes afirmaciones: *

Marca solo un óvalo por fila.

	Totalmente de Acuerdo	De acuerdo	Neutral	En desacuerdo	Totalmente en desacuerdo
En la empresa nos permiten buscar nuevas ideas por medio de experimentos	◯	◯	◯	◯	◯
Descubrimos ideas nuevas relacionando las tendencias y los patrones ajenos al sector con mi organización.	◯	◯	◯	◯	◯
Combinamos distintas maneras de resolver problemas tomando las ideas de otros sectores que no guardan relación con nuestra organización.	◯	◯	◯	◯	◯
La empresa visita otras organizaciones para buscar nuevas formas de hacer las cosas.	◯	◯	◯	◯	◯
En la empresa se promueve que hablemos con personas	◯	◯	◯	◯	◯

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10. En qué grado te identificas con las siguientes afirmaciones: *

Marca solo un óvalo por fila.

	Totalmente de acuerdo	De acuerdo	Neutral	En Desacuerdo	Totalmente en desacuerdo
En la empresa se hacen preguntas perspicaces de tipo "qué pasaría si" que dan lugar a la exploración de nuevas posibilidades.	◯	◯	◯	◯	◯
Constantemente los colaboradores de la organización sienten la confianza de hacer preguntas que invitan a reflexionar para llegar a la raíz del problema	◯	◯	◯	◯	◯
La empresa resuelve los problemas con originalidad y creatividad	◯	◯	◯	◯	◯
Se presta atención a las experiencias del día a día para obtener nuevas idea	◯	◯	◯	◯	◯
Toma en cuenta las ideas de las personas	◯	◯	◯	◯	◯

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A menudo asumen riesgos para implementar iniciativas	☐	☐	☐	☐	☐
Llevan a cabo pruebas piloto para validar si tendrá éxito sus propuestas	☐	☐	☐	☐	☐
En la empresa revisan constantemente los resultados del desempeño	☐	☐	☐	☐	☐
En la empresa se establecen acciones para corregir el desempeño	☐	☐	☐	☐	☐
Sostienen reuniones para revisar los resultados del desempeño y aclarar la situación	☐	☐	☐	☐	☐
Piden a los equipos que compartan sus historias de éxito	☐	☐	☐	☐	☐
Piden a los equipos que compartan sus victorias rapidas (quick wins)	☐	☐	☐	☐	☐

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11. En qué grado te identificas con las siguientes afirmaciones: *

Marca solo un óvalo por fila.

	Totalmente de acuerdo	De acuerdo	Neutral	En Desacuerdo	Totalmente en desacuerdo
Tiene procedimientos formales dedicados al seguimiento y mejora de la estrategia y sus elementos (objetivos, KPIs, Planes de acción, tácticas, etc.).	◯	◯	◯	◯	◯
Con que nivel aplican los procedimiento o normas relacionadas con la estrategia e innovación	◯	◯	◯	◯	◯
Tiene su empresa un presupuesto para proyectos de innovación	◯	◯	◯	◯	◯
Reconocer líderes de las estrategias exitosas	◯	◯	◯	◯	◯
Incentivan monetariamente a los líderes y colaboradores que reportan logros	◯	◯	◯	◯	◯

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13. Según su percepción, respecto de las ventas brutas que porcentaje del presupuesto esta dedicado a la innovación

Marca solo un óvalo.

- ◯ Entre 0% y 1%
- ◯ Entre 1.01% y 2%
- ◯ Entre 2.01% y 3%
- ◯ Entre 3.01% y 5%
- ◯ Entre 5.01% y 10%
- ◯ Mayor que 10%

14. Según su percepción, respecto de las ventas brutas que porcentaje del presupuesto esta dedicado a la innovación

Marca solo un óvalo.

- ◯ Entre 0% y 1%
- ◯ Entre 1.01% y 2%
- ◯ Entre 2.01% y 3%
- ◯ Entre 3.01% y 5%
- ◯ Entre 5.01% y 10%
- ◯ Mayor que 10%

15. En promedio con que frecuencia revisan las normas y procedimientos en la empresa

Marca solo un óvalo.

- ◯ Trimestral
- ◯ Semestral
- ◯ Anual
- ◯ cada dos años
- ◯ Cada 3 o más años

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16. En qué grado te identificas con las siguientes afirmaciones: *

Marca solo un óvalo por fila.

	Totalmente de acuerdo	De acuerdo	Neutral	En Desacuerdo	Totalmente en desacuerdo
En comparación con los pares de la industria, estamos por encima de los resultados	◯	◯	◯	◯	◯
Consistentemente hemos alcanzado los objetivos de negocio en los últimos dos años	◯	◯	◯	◯	◯
En comparación con los pares de la industria, tenemos alta capacidad de respuesta a la evoluciónde las demandas de los clientes	◯	◯	◯	◯	◯
Dentro de los últimos 5 años en la organización se han recibido reconocimientos por innovaciones en el mercado	◯	◯	◯	◯	◯

Disposición para introducción de productos/servicios nuevos o nuevos mercados

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17. En qué grado te identificas con las siguientes afirmaciones: *

Marca solo un óvalo por fila.

	Totalmente de acuerdo	De acuerdo	Neutral	En Desacuerdo	Totalmente en desacuerdo
En la empresa lanzan productos o servicios nuevos con una alta frecuencia					
Constantemente hacen mejoras a los productos/servicios existentes					
Hacemos constantemente mejoras significativas en el envase o el empaque					
En la empresa lanzan productos o servicios nuevos, generalmente antes que los competidores					
Uso de tecnologías de información en los canales de comercialización					
Disposición para introducción de productos/servicios nuevos o nuevos mercados					

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18. Con que frecuencia lanzan un producto o servicio nuevo al mercado *

Marca solo un óvalo.

- Mensual
- Trimestral
- Semestral
- Anual
- Un producto/servicio cada dos años
- Un producto/servicio cada tres a cinco años
- Un producto/servicio en un tiempo mayor a 5 años

19. Disposición para introducción de productos/servicios nuevos o nuevos mercados *
Con que frecuencia lanzan un producto o servicio nuevo al mercado?

Marca solo un óvalo.

- Mensual
- Trimestral
- Semestral
- Anual
- un producto/servicio cada dos años
- Un producto/servicio cada tres a cinco años
- Un producto/servicio en un tiempo mayor a 5 años

Disposición para introducción de nuevos procesos

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20. En qué grado te identificas con las siguientes afirmaciones:

Marca solo un óvalo por fila.

	Totalmente de acuerdo	De acuerdo	Neutral	En Desacuerdo	Totalmente en desacuerdo
En la empresa introducen nuevos procesos y los hacen funcionar con alta frecuencia	◯	◯	◯	◯	◯
En la empresa tienen renovación de equipos tecnologicos	◯	◯	◯	◯	◯
En la empresa introducen nuevos procesos, generalmente antes que los competidores	◯	◯	◯	◯	◯
En la empresa introducen nuevos metodos de producción	◯	◯	◯	◯	◯
Disposición para introducción de nuevos procesos	◯	◯	◯	◯	◯

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Con que frecuencia lanzan un proceso nuevo en la empresa	◯	◯	◯	◯	◯

21. Disposición para introducción de nuevos procesos *
Con que frecuencia lanzan un proceso nuevo en la empresa

Marca solo un óvalo.

- ◯ Mensual
- ◯ Trimestral
- ◯ Semestral
- ◯ Anual
- ◯ Un proceso cada dos años
- ◯ Un proceso cada tres a cinco años
- ◯ Un proceso en un tiempo mayor a 5 años

Disposición para implementación de sistemas de gerencia

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22. En qué grado te identificas con las siguientes afirmaciones: *

Marca solo un óvalo por fila.

	Totalmente de acuerdo	De acuerdo	Neutral	En Desacuerdo	Totalmente en desacuerdo
En la empresa introducen nuevos sistemas o estilos de gerencia con alta frecuencia					
En la empresa introducen nuevos sistemas o estilos de gerencia antes que los competidores					
En la empresa introducen cambios en los estilos de liderazgo					
Disposición para implementación de sistemas de gerencia					
Con que frecuencia lanzan un nuevo cambio en el sistema o estilo gerencial					
En la empresa introducen nuevas estructuras organizacionales ademas de nuevos procesos					

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En la empresa adaptan su estilo o sistema gerencial acorde a la región o país en donde opera					

23. Disposición para implementación de sistemas de gerencia *

Con que frecuencia lanzan un nuevo cambio en el sistema o estilo gerencial

Marca solo un óvalo.

- Mensual
- Trimestral
- Semestral
- Anual
- Un proceso cada dos años
- Un proceso cada tres a cinco años
- Un proceso en un tiempo mayor a 5 años

Busqueda de nuevos modelos de negocio

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24. En qué grado te identificas con las siguientes afirmaciones:

Marca solo un óvalo por fila.

	Totalmente de acuerdo	De acuerdo	Neutral	En Desacuerdo	Totalmente en desacuerdo
En la empresa lanzan al mercado cambios en su modelo de negocio	◯	◯	◯	◯	◯
En la empresa han modificado su modelo de negocio en lo que respecta a la propuesta de valor	◯	◯	◯	◯	◯
En la empresa han modificado su modelo de negocio en lo que respecta a relaciones con los clientes	◯	◯	◯	◯	◯
En la empresa han modificado su modelo de negocio en lo que respecta a los canales de comercialización	◯	◯	◯	◯	◯
En la empresa han modificado su modelo de negocio en lo que respecta a los segmentos de clientes	◯	◯	◯	◯	◯

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En la empresa han modificado su modelo de negocio en lo que respecta a diversificar las fuentes de ingresos	☐	☐	☐	☐	☐
En la empresa han modificado su modelo de negocio en lo que respecta a diversificar los socios clave	☐	☐	☐	☐	☐
En la empresa han modificado su modelo de negocio en lo que respecta a las actividades clave	☐	☐	☐	☐	☐
En la empresa han modificado su modelo de negocio en lo que respecta a los recursos clave	☐	☐	☐	☐	☐
En la empresa han modificado su modelo de negocio en lo que respecta a la estructura de costos	☐	☐	☐	☐	☐

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Frecuentemente interactúo con una amplia red de contactos para obtener ideas de productos o servicios nuevos	☐	☐	☐	☐	☐
Comunican en su empresa las motivaciones de compra del consumidor	☐	☐	☐	☐	☐
En la organización gestionan el conocimiento para aprender	☐	☐	☐	☐	☐
Facilitan el entrenamiento necesario para ejecutar las tareas	☐	☐	☐	☐	☐

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	Totalmente de acuerdo	De acuerdo	Neutral	En Desacuerdo	Totalmente en desacuerdo
Respecto del portafolio de investigación, en la empresa colectan las iniciativas que los colaboradores proponen	○	○	○	○	○
Implementan nuevas tecnologías	○	○	○	○	○
Utilizan herramientas de colaboración digital	○	○	○	○	○
Evaluación de su portafolio de iniciativas y la capacidad de su organización para cumplir con lo que está comprometido	○	○	○	○	○
Nuevas amenazas y cambios son abordados en iniciativas existentes.	○	○	○	○	○
Ajustar rápidamente la estrategia cuando la implementación revela nuevos riesgos y oportunidades	○	○	○	○	○
Las nuevas iniciativas se desarrollan y abordan adecuadamente ante las nuevas oportunidades	○	○	○	○	○