Contents

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The determinants of trust and perceived risk on bitcoin users

Los determinantes de confianza y riesgo percibido sobre los usuarios de bitcoin

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Abstract

One of the possible determinants of the intention to use bitcoin may be the trust of users because in the short time of validity of the cryptocurrency has proven to be a real option against fiat money. In this regard it should be added that few studies consider trust as a determinant of the use of Bitcoin; therefore, the purpose of this research is to know what are the factors on which trust is based and to know to what extent the perceived risk has a negative connotation on the use of cryptocurrency. To accomplish this, a model is integrated and is analyzed under the methodology of structural equations by partial least squares (PLS-SEM), applied to a sample of 174 bitcoin users. The evaluation of the seven theoretical hypotheses indicates that the key elements of trust are structural guarantees and familiarity since they determine the intention of use and this, in turn, the actual use; unlike calculative-based trust and situational normality, which are not very significant. The perceived risk was shown to have little relation to the intended use. Therefore, Bitcoin-related service providers should focus on generating trust situations for users based on security and regulations and creating environments that generate familiarity.

Resumen

Uno de los posibles determinantes de la intención de usar bitcoin puede ser la confianza de los usuarios, ya que en el poco tiempo de vigencia de la criptomoneda ha demostrado ser una opción real frente al dinero fiduciario. En este aspecto, cabe añadir que existen pocos estudios que consideran a la confianza como un determinante del uso de bitcoin, por lo que el objetivo de este estudio es investigar los factores en los que se basa la confianza y conocer hasta qué punto el riesgo percibido tiene una connotación negativa sobre el uso de la criptomoneda. Para ello se integra un modelo que es analizado bajo la metodología de ecuaciones estructurales por mínimos cuadrados parciales (PLS-SEM), aplicado a una muestra de 174 usuarios de bitcoin. Los resultados de la evaluación de siete hipótesis teóricas indican que los elementos clave de la confianza son las garantías estructurales y la familiaridad ya que determinan la intención de uso y este a su vez el uso real; a diferencia de la confianza basada en las garantías estructurales y la normalidad situacional que son poco significativas. El riesgo percibido demostró tener poca relación con la intención de uso. Por lo tanto, los proveedores de servicios relacionados con bitcoin deben enfocarse en generar situaciones de confianza para los usuarios basadas en la seguridad y las regulaciones, además de crear entornos que generen familiaridad.

Keywords | palabras clave

Trust, perceived risk, behavioral intention, bitcoin, digital transactions, PLS-SEM model, structural assurances.
Confianza, riesgo percibido, intención de uso, bitcoin, transacciones digitales, modelo PLS-SEM, garantías estructurales.

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Introduction

The digitization of the economy has transformed economic activities to be more effective and flexible, the economic crisis caused by Covid-19 and the health measures imposed by governments around the world create environments where transactions by digital means are more important (Yeong et al., 2019). From January 2019 to April 2021, in the midst of the crisis, the total market value of cryptocurrencies multiplied 15 times with an approximate market value of one trillion dollars (Anglo-Saxon), equivalent to the 2021 GDP of countries like Mexico, Spain or Switzerland, with more than 10 000 different cryptocurrencies in the market (Coinmarketcap, 2021), therefore a study on the subject can help companies or governments to know the advantages of cryptocurrencies, as is the case of the digital yuan and the evolution of the financial market infrastructure since there are more than 100 million confirmed users in the world (Blandin et al., 2020).

Lately, significant progress has been made regarding the understanding of trust in electronic commerce and, therefore, in cryptocurrencies, since trust becomes more significant in these areas, making it difficult to verify regulations, uses, and customs in commerce and In all digital transactions, communication networks are now more linked to financial services as mobile banking offers more benefits over traditional banking, such as balance verification and instant fund transfer (Afshan & Sharif, 2016; Gefen et al., 2003; Kim et al., 2009). Commerce through electronic means goes beyond its interface, trust is an element that goes beyond the transactional relationships of users, especially those that contain some aspect of risk (Gefen et al., 2003).

Due to the particular characteristic of virtuality, cryptocurrencies could imply a great risk and uncertainty, which reduces their trust for being adopted. Trust corresponds to the expectation that others will not behave opportunistically, that the other party will fulfill their obligations despite their dependence and vulnerability, making certain regulation necessary, since, when there is no minimum effective regulation in digital media, users have to trust the technology they will use (Gefen et al., 2003; Zhou, 2012). To do this, the concept of trust is reviewed in relation to bitcoin and cryptocurrencies, the theories that explain it, and how it can be measured; secondly, the factors that generate trust are analyzed in order to know how these factors contribute to achieving the objectives of this research work; third, a conceptual model is presented incorporating its methodological analysis; fourth, the results of the application of the model are presented and finally a discussion of the results is carried out, including the conclusions.

1.1. Theoretical framework

1.1.1. Bitcoin

Bitcoin has emerged as a new alternative to payment methods, with multiple benefits for users such as anonymity and low transaction fees (Yeong et al., 2019). It consists of a public and decentralized payment system that is based on Blockchain technology, which consists of a record of all the transactions that are carried out (Inoue, 2016). Blockchain technology requires that all payment system procedures be carried out by voluntary users who provide processing capacity through their computers, they confirm the transactions and process the data that is added to the chain, all transactions, and new Blocks generate commissions that are distributed equitably (Sadhya et al., 2018).

1.1.2. Trust

Trust has been proposed as a one-dimensional construction, ignoring the large amount of evidence that suggests that it is a complex construction and of a multi-dimensional nature, for which we conduct a review of the factors that lead to trust, each one contributes to a perspective of this concept since it can take different forms and relationships, therefore trust in digital media is a combination of multiple factors (Gefen et al., 2003; Kim & Prabhakar, 2004). Trust is a multidimensional construction, which occurs in digital media, despite the lack of human interaction, which explains its importance (Gefen & Straub, 2004).

Trust can be defined as a combination of reliability, integrity, and benevolence of electronic providers with the belief that these generate behavioral intentions among consumers, a definition that separates trust from actual behavioral intentions since trust positively affects them (Gefen et al., 2003; Mayer et al., 1995). In digital media, there is no detailed contract that grants legal protection or that binds the parties when it is breached, therefore the experience that occurs between users generates trust since it establishes the credibility on the part of the seller that it will provide what is promised. (Villarroel-Puma & Berenguer-Contri, 2020; Gefen et al., 2003).

There are different antecedents of trust that help to better understand this concept, for example: 1) familiarity, suggests that trust develops over time, resulting from experience between the parties (Gefen et al., 2003); 2) trust based on calculation: it is based on economic principles since the creation of trust implies a calculating process (Gefen et al., 2003); 3) trust based on the institution, refers to the evaluation that the transaction will be successful based on what is usual in situations of this type (Gefen et al., 2003); 4) trust based on structural guarantees, refer to the evaluation of success due to safety nets, legal resources and regulations (Gefen et al., 2003); 5) the propensity to trust, refers to the fact that trust depends on an individual's willingness to trust (Gefen & Straub, 2004); 6) predictability: it is the belief that the seller will behave reliably (Gefen & Straub, 2004).

The foregoing shows that a new type of trust has emerged based on technology, which must be considered in a multidimensional way, in order to know which factors better explain it, which we will analyze in more detail below.

1.1.3. The perceived risk

Perceived risk is the disposition of individuals towards risk (Diez-Farhat, 2020), the literature indicates that it is a very important element, especially in those impersonal relationships in which a risk situation is contemplated and that trust should not be analyzed trust without considering risk, especially in relationships where there is uncertainty, the inclusion of this variable is very important since the decision to use a technology or not is based on a cost-benefit analysis, thus risk must play a central role (Gefen et al., 2003; Pavlou, 2003). There are studies that have analyzed risk, finding that users perceive a high risk when using electronic services and cryptocurrencies since it is a factor that hinders the behavioral intention (Alalwan et al., 2018; Esmaeilzadeh et al., 2019; Xie et al., 2017).

In the present context, we adopt this position in the face of risk as a negative connotation about the user's intentions to use some technology that leads an individual to incur a loss in the search for a result.

1.1.4. Empirical evidence

The adoption of cryptocurrencies has been analyzed in different ways. Table 1 provides a brief description of the acceptance and trust studies that have been done on

cryptocurrencies and bitcoin, it shows which acceptance theories have been applied, the methodologies that have been used to analyze data, and the main results. Despite the apparent maturity derived from this comparison, none of them analyze multidimensional trust or include perceived risk.

It was found that all the reviewed works present an adequate application of the different theoretical variables of the acceptance models, integrating them with the concept of trust, in all of them the reliability and validity of the models were successfully verified, all studies showed that Trust is one of the most important elements, consequently this element should be analyzed in-depth (López-Zambrano & Camberos-Castro, 2020; Mahomed, 2017; Roos, 2015; Shahzad et al., 2018). It is shown that there are few studies that analyze trust in bitcoin or cryptocurrencies and that, of the four mentioned above, none values it in a multidimensional manner, nor is perceived risk a complement to trust. While it is true that trust is a determining factor in the use of cryptocurrencies, it is necessary to make a multidimensional analysis and include perceived risk to know which elements are the most important (Gefen et al., 2003).

Table 1. Review of empirical evidence

Author	Theory and concepts	Context	Methodology	Results
Mahomed (2017)	UTAUT2 and trust	Adoption of cryptocurrencies	Multiple linear regression	Trust 25 %. The model explains 29 % of the intention.
Roos (2015)	UTAUT2 and trust	Adoption of cryptocurrencies in SMEs	Descriptive analysis	The study shows that trust is the most important factor.
Shahzad et al. (2018)	TAM, Consciousness, and confidence	Adoption of cryptocurrencies in China	SEM	The model manages to explain 51 % of the intention, with trust being the determining factor.
López y Camberos (2020)	UTAUT2 and trust	Bitcoin adoption in Mexico.	PLS-SEM	The model manages to explain 79.3 % of the intention to use and 30.6 % of the actual use.

Source: López-Zambrano and Camberos-Castro (2020); Mahomed (2017); Roos (2015); Shahzad et al. (2018).

1.1.5. Integration of the conceptual model

When analyzing the different models and theories of trust we find that the Gefen (2003) model is the one that best adapts since it contemplates the part of the initial trust considering that the phenomenon of cryptocurrencies is relatively new, since it has been in force since 2008 (Nakamoto, 2008). In turn, the variables of this model contemplate other dimensions that manage to synthesize different concepts into one (Aljaafreh et al., 2014; Kim et al., 2009; Sun et al., 2017).

Risk is analyzed one-dimensionally because the perceived risk scale used by Xie et al. (2017) was validated and proved to be robust considering all the dimensions proposed by Featherman and Pavlou (2003) and Lee (2009).

Therefore, the model in Figure 1 where the exogenous variables of trust based on calculation, trust based on structural guarantees, situational normality, and perceived

risk that affect the endogenous variables of trust, intention to use, and actual use is proposed. Trust and perceived risk are found to be the most important elements for bitcoin to be accepted. The objective of the model is to try to measure the relationships of a user when initiating contact with a new technology and how they increase with the interaction, generating the necessary trust, without it, the user will not use said technology (Alalwan et al., 2017; Aljaafreh et al., 2014; Sun et al., 2017).

In order to better guide the analysis, different hypotheses of how the factors of the integrated model affect the intention to use are described below:

H1. Trust bases on calculation (CB) Positively Affects Trust in Bitcoin

Calculation-based trust occurs when the seller has nothing to gain by not being trustworthy, but Blockchain technology turns bitcoin into a decentralized means of payment that is not controlled by any person or institution, which makes it a service with integrity and trustworthiness, although there are companies and individuals that provide their services through bitcoin such as online wallets or exchangers that generate income through commissions, it is expected that these companies have a lot to lose by not be reliable and a lot to gain from using Blockchain.

H2. Perceptions of structural guarantees (SA) built into bitcoin positively affect user confidence

Trust based on structural guarantees refers to the evaluation of success due to the resources of Blockchain technology, which supports bitcoin and allows to have a secure payment network that is impossible to break (Sadhya et al., 2018). Although it is true that currently, most countries in the world have laws that regulate the use of bitcoin and the companies that offer their services through it, these may still have loopholes. It is expected that companies that offer their services through bitcoin, especially those that operate in the cloud, must offer the necessary structural guarantees.

H3. The perception of situational normality (SN) positively affects trust in bitcoin

Trust based on the institution in terms of situational normality refers to the fact that transactions are achieved because it is habitual, unlike familiarity, situational normality does not deal with knowledge of technology, but refers to the measurement in which the interaction with a certain technology is normal compared to other similar technologies (Gefen et al., 2003). When users make transfers through bitcoin, they are expected to be successful or when they store their assets in a bitcoin wallet, they expect them to be protected, similar to online banking.

H4. Familiarity (FL) with the use of bitcoin positively increases trust in it

Familiarity suggests that trust develops over time, with the interaction with technology that results in experience, which should increase trust since it implies greater experience derived from accumulated knowledge (Gefen et al., 2003). The use of bitcoin implies a progressive involvement on the part of the user since it is necessary to have technical and financial knowledge for its use, so an increase in knowledge and accumulated previous successful interactions lead to higher levels of trust.

H5. Trust (T) positively affects users' intention to use bitcoin

Trust can be defined as a combination of reliability, integrity, benevolence, and capacity of the user to use certain technology with the belief that behavioral intentions can be generated. Therefore, high levels of trust such as specific beliefs about a technology increase the intention of use (Alalwan et al., 2017; Gefen et al., 2003). Trust in

bitcoin helps the user to subjectively rule out undesirable situations derived from its use, especially by service providers.

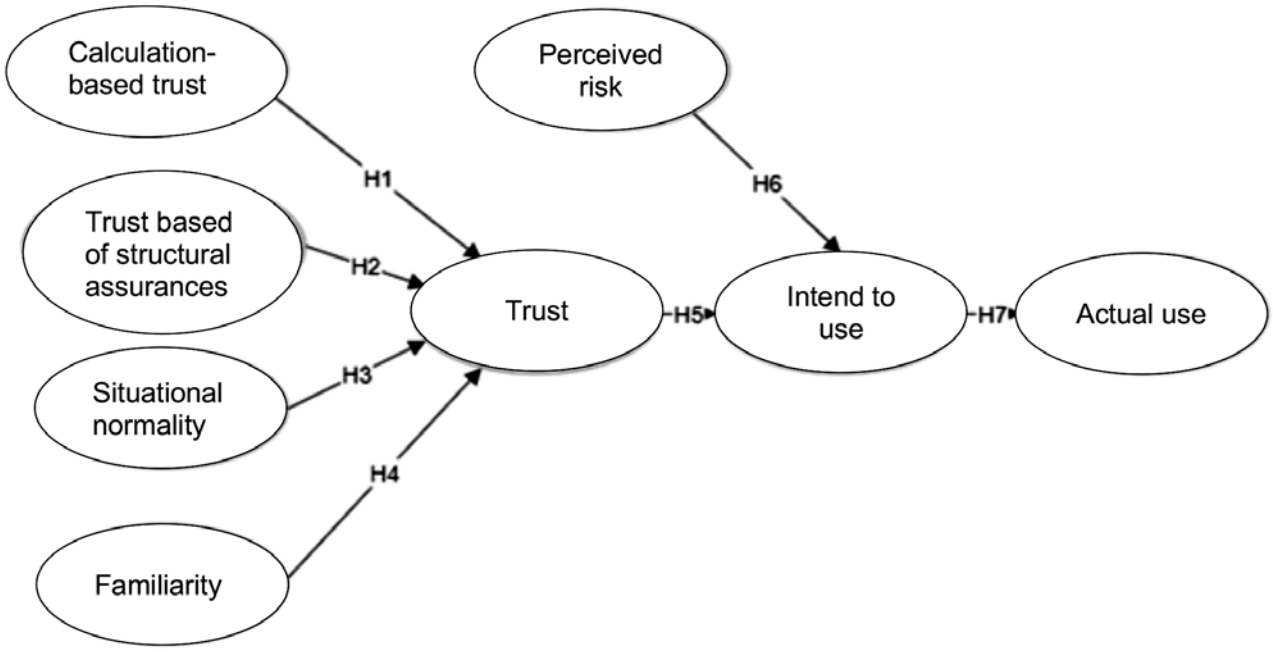
H6. Perceived risk (PR) has a negative effect on the intention to use bitcoin

Perceived risk refers to the belief of an individual to incur a loss in search for a result, the interest in this factor is due to the high uncertainty, intangibility, and the absence of human interaction of online transactions (Alalwan et al., 2018; Xie et al., 2017). The financial risks when using bitcoin have proven to be one of the main obstacles when adopting it due to its high volatility, as well as the possible security breaches that bitcoin service providers such as wallets or exchange houses may suffer (Abramova & Böhme, 2016; Sas & Khairuddin, 2015). Thus, an increase in the feeling of risk in users negatively affects the intention to use bitcoin.

H7. Intent to use (IU) positively affects actual use (AU) of bitcoin

The intention of use assumes that the actual use of bitcoin is predicted by the willingness of users to adopt this technology (López-Zambrano & Camberos-Castro, 2020).

Figure 1. Conceptual model



Source: Own elaboration with data from Gefen (2003).

2. Methodology

The structural equation model (SEM) is a technique to estimate causal relationships applying a combination of statistical data that allows researchers to test theories, concepts and verify the relationships between variables at theoretical levels (Hair et al., 2018; Hair et al.., 2012; Oliveira et al., 2016; Owusu-Kwateng et al., 2019). The SEM model can be approached from the technique based on covariance (CB-SEM) which minimizes the discrepancy between covariance matrices or by means of structural equations by partial least squares (PLS-SEM) that maximizes the explained variance of the variables (Hair et al., 2016; Oliveira et al., 2016). This second technique is less

restrictive in terms of data distribution and indicates that the sample size must be greater than 10 times the number of trajectories that point to some variable, in this case, the minimum sample size to consider is 70 (Hair et al., 2016; Zhou et al., 2010). The distribution of the sample was evaluated through the Kolmogorov-Smirnov (K-S) test, detecting that the data are not normally distributed since the significance levels were less than 0.05. Based on the above, the PLS-SEM model is the most consistent method for this type of study, considering that the anonymous nature of the use of cryptocurrencies does not allow very large samples to be obtained (López-Zambrano & Camberos-Castro, 2020; Oliveira et al., 2014).

Another reason for using the PLS-SEM technique is that it uses reflective indicators and that the study tries to predict fundamental constructs such as trust and risk, which are based on an exploratory investigation as they are a recent phenomenon. For this, the statistical software package SMART -PLS version 3.3.2 is the most appropriate for the analysis of results (Leyva et al., 2014).

2.1. Measurement

Based on the background review proposed in the theoretical section, an electronic questionnaire was developed and tested to improve it, and an electronic questionnaire was applied through the Google Forms platform in Spanish, which was validated in front of a panel of experts in the areas of economics and finance, the items and the scales related to trust were adapted from Gefen (2003), the items and the perceived risk scale were adapted from Xie et al. (2017), to measure the constructs, 26 reflective indicators (questions) related to each variable were used. The unit of analysis of this study is Bitcoin users in Mexico and the responses are measured through a 7-point Likert scale at interval levels ranging from "totally disagree" to "totally agree". The frequency of use was measured on a scale ranging from "never" to "several times a day". The demographic questions that are included are related to age, gender, and educational level in order to know the environment of the users. In order to carry out a pilot test, the questionnaire was distributed through the Airbit Club platform related to cryptocurrencies. Preliminary evidence indicated that the scales were valid and reliable; It should be noted that these responses were not included in the final results.

2.2. Data

In order to detect the largest number of bitcoin users, a non-probabilistic sampling was chosen for convenience since the anonymous nature of this cryptocurrency makes it difficult to obtain data, one of the advantages of this approach is that it obtains reliable and accurate information since the respondents are familiar with the subject of study (Owusu-Kwateng et al., 2019). Through the Autonetworks software, 13 groups of users of the social network Facebook were detected, only in Mexico, since it would take too long to consider other countries because the software used only allows sending 100 personalized messages per day, of which we extracted the names of 9000 users to whom the survey was sent through personalized messages, obtaining 174 responses validated with statistical tools that are explained in detail in the following section.

3. Results

The response profile of the respondents is observed in Table 2 where only 11 % are women, the average age is 32 years and the majority (76 %) have a university degree.

Table 2. Demographic information

	#	%
Gender		
Male	154	88.5
Female	19	10.9
Other	1	0.6
Age		
Under 20	6	3.4
21-25	43	24.7
26-35	69	39.7
36-45	39	22.4
Over 46	17	9.8
Education		
Primary	2	1.1
High school	6	3.4
Preparatory	34	19.5
Bachelor's degree	104	59.8
Postgraduate	28	16.1

Source: Own elaboration

3.1. Measurement model analysis

In order to know the reliability and validity of the model, the internal consistency, the reliability of the indicator, the convergent validity, the average of the extracted variance (AVE), and the discriminant validity are calculated (Hair et al., 2014). To measure the internal consistency of the measurement model, the composite reliability (CC) and Cronbach's alpha were evaluated, whose values must be greater than 0.70 as indicated in Table 3 (Alalwan et al., 2017; Oliveira et al., 2014).

Table 3. Internal consistency and validity

Variable	Cronbach's α	CC	AVE	Ítem	Indicator
Calculation-based	0.821	0.893	0.735	BC1	0.861
				BC2	0.854
				BC3	0.856
Trust	0.903	0.933	0.777	T1	0.929
				T2	0.824
				T3	0.853
				T4	0.915
Familiarity	0.735	0.849	0.66	FL1	0.584
				FL2	0.908
				FL3	0.902

Variable	α de Cronbach	CC	AVE	Ítem	Indicador
Structural guarantees	0.856	0.903	0.7	SA1	0.874
				SA2	0.865
				SA3	0.892
				SA4	0.702
Intent of use	0.888	0.923	0.75	IU1	0.869
				IU2	0.832
				IU3	0.936
				IU4	0.823
Situational normality	0.867	0.918	0.789	SN1	0.876
				SN2	0.882
				SN3	0.906
Perceived risk	0.794	0.863	0.617	PR1	0.894
				PR2	0.882
				PR3	0.612
				PR4	0.717
Frequency	1	1	1	FREC	1

Source: Own elaboration

The reliability of the indicator helps us to know the convergent validity of the model, by eliminating an indicator it tells us if the composite reliability increases, the values must be greater than 0.5 as observed in Table 3 (Hair et al., 2014). Finally, it is observed in Table 3 that the AVE values are greater than 0.5, therefore each construct explains more than half of the variance, indicating that the constructs are valid and reliable (Hair et al., 2014; Mensah et al., 2020).

To satisfy the discriminant validity of the scales, they are evaluated using the Fornell-Larcker method, which establishes that the square root of AVE must be greater than all the relationships between each construct, thus each construct shares more variance with its indicators than with any other. Table 4 shows that the value of each variable is greater than that of its highest correlation (Hair et al., 2014; Oliveira et al., 2016).

Table 4. Fornell-Larcker criterion

	CB	T	FL	SA	IU	SN	PR	AU
CB	0.857							
T	0.305	0.881						
FL	0.158	0.702	0.812					
SA	0.402	0.817	0.568	0.837				
IU	0.285	0.777	0.652	0.717	0.866			
SN	0.36	0.35	0.334	0.503	0.304	0.888		
PR	-0.127	-0.251	-0.167	-0.243	-0.228	-0.086	0.785	
AU	0.083	0.281	0.38	0.224	0.407	0.074	-0.124	1

Source: Own elaboration

3.2. Structural model analysis

The structural model is analyzed after having confirmed the reliability and validity of the model, the causal relationships between the independent and dependent variables are analyzed through the determination coefficient (R2) (Leyva-Cordero & Olague, 2014). To measure the bias of the results, their collinearity is analyzed with the variance inflation factor (VIF), which must fluctuate between 0.2 and 5. Table 5 shows that the values of this analysis are in the allowed range, thus it can be said that there is no collinearity between the variables (Hair et al., 2014; Venkatesh et al., 2012).

Table 5. Multicollinearity Statistics (VIF)

	CZ	IU	AU
CB	1.257		
T		1.067	
FL	1.501		
SA	1.927		
IU			1
SN	1.405		
PR		1.067	

Source: Own elaboration

The Bootstrapping resampling technique is used to know the importance of the significance levels of the path coefficients because the PLS-SEM method uses non-normal distributions (Hair et al., 2012; Owusu-Kwateng et al., 2019). This technique extracts subsamples of the original data and estimates models for each subsample, in this case, they used 5000 estimates that were used to calculate the standard error and thus determine the importance of each parameter using the t-values (Hair et al., 2014). For this study, non-significant values were considered to be those greater than a probability error of 5 %. In this regard, Table 6 shows that confidence based on calculation does not significantly affect confidence, as does the perceived risk on the intention to use.

Table 6. Significance test

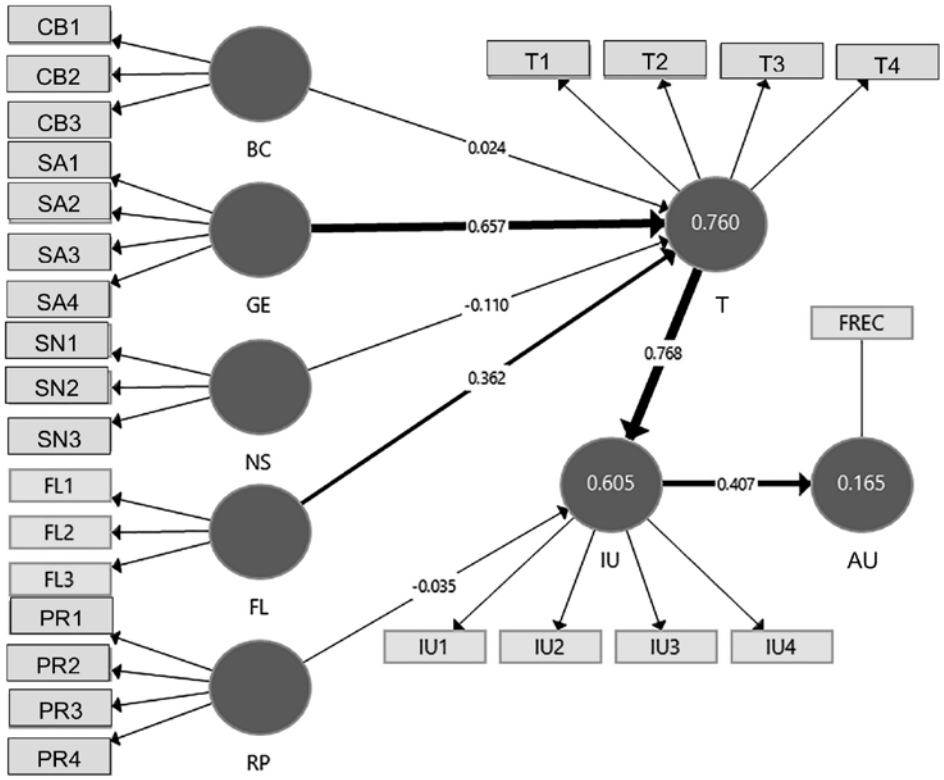
Trajectory	T Value (|O/STDEV|)	P value	Significance
CB -> T	0.584	0.559	Not significant
T -> IU	14.096	0	Significant
FL -> T	6.143	0	Significant
SA -> T	10.946	0	Significant
IU -> AU	4.607	0	Significant
SN -> T	2.211	0.027	Significant
RP -> IU	0.687	0.492	Not significant

Source: Own elaboration

The coefficient of determination R2 is a measure of predictive precision and corresponds to the combined effects of exogenous variables on endogenous variables, where values closer to 1 correspond to a higher degree of prediction (Hair et al., 2014; Vinzi et al., 2010). According to Hair et al. (2012), the recommended sample size to

obtain significant R2 values greater than 0.25 must be greater than 144, therefore values of 0.75, 0.50, and 0.25 are considered substantial, moderate, and weak respectively. In this regard, R2 helps us to interpret the statistical test of the hypotheses, in Figure 2 it is observed that the hypotheses H1, H3, and H6 are not significant, the hypotheses H2, H4, H5, and H7 are confirmed, the structural guarantees being the most important element, explaining 65.7 % of the trust and that only trust can predict 60.5 % of the intention to use.

Figure 2. Results of the structural model



Source: Own elaboration

Because the estimation of R^2 may not be enough to evaluate the entire structural model, it is necessary to carry out other procedures (Vinzi et al., 2010), thus the Q^2 value is used to know the predictive relevance of the model, it is measured through a data reuse technique that omits a part of them and predicts the omitted part by estimating the parameters of which values ranging from -1 to +1 are obtained, with values greater than 0 being those that imply high predictive relevance (Hair et al., 2014).

Table 7. Predictive relevance (Q^2)

Construct	Q^2	Significance
T	0.581	Significant
IU	0.444	Significant
AU	0.159	Significant

Source: Own elaboration

In this regard, the effect size (f2) is also evaluated by observing the changes in R2 when a specific construct is eliminated to evaluate the influence on the endogenous

variable, with values of 0.02, 0.15, and 0.35 representing small, medium, and large effects respectively (Hair et al., 2016). In turn, the effect size (f2) of Q2 can also be evaluated to know the relative impact of the predictive relevance q2 (Hair et al., 2016). In Table 8 it can be observed that familiarity and structural guarantees had a great effect on trust, as well as on the intention to use; the intention to use had a medium effect on the actual use, as for the other trajectories their effects were not relevant. Regarding q2, only FL and SA had a high predictive relevance on confidence.

Table 8. Effect size (f^2) and relative impact of predictive relevance (q^2)

Trajectory	f^2	q^2
BC -> CZ	0.002	-0.002
CZ -> IU	1.403	
FL -> CZ	0.363	0.165
GE -> CZ	0.933	0.418
IU -> UR	0.198	
NS -> CZ	0.036	0.014
RP -> IU	0.003	-0.009

Source: Own elaboration

4. Discussion and conclusions

There are different studies (Gefen, 2000; Gefen et al., 2003; Gefen & Straub, 2004; Kim et al., 2009; Kim & Prabhakar, 2004; Sun et al., 2017; Zhou, 2012) that point out the importance of analyzing trust as a complex and multidimensional variable and not just as an isolated element, a finding that was proven by López and Camberos (2020) in an investigation on the acceptance of bitcoin in Mexico. In this framework, according to statistical tests, the reliability and validity measurement model yielded positive results (Hair et al., 2012), highlighting that it has high predictive levels by explaining 60.5 % of the intention to use, in terms of Trust, the factor that best explains it is that of structural guarantees, with 65.7 % (Hair et al., 2016).

The analysis of the hypotheses shows that Trust based on calculations (H1) and the situational normality (H3) are not very significant since their effect and relevance are low, which shows that the intention to use bitcoin does not depend on the company that facilitates the wallet or exchange service and that users do not consider similar applications to use bitcoin (Gefen et al., 2003). Trust based on structural guarantees has a significant effect, since it explains most of it, confirming H2, being the main element of trust with an effect size (f2) and predictive relevance considered high. However, the problem is that trust is highly related to GE by means of the Fornell-Larcker criterion, where bitcoin guarantees exclude suspicious elements (Gefen et al., 2003), thus it is recommended to replace or combine this element with trust in future studies in order to generate models with the fewest possible variables.

In relation to familiarity, hypothesis (H4) is confirmed since it has a positive effect on trust by explaining 36.2 % of it, it also has a high effect and its relevance is significant. Thus, it can be said that users of bitcoin consider it necessary to review and be updated on the status of the cryptocurrency based on interactions with the Bitcoin interface and not on a social relationship (Gefen, 2000; Gefen & Straub, 2004). Regarding the perceived risk, the results are in accordance with the theory that men-

tions that it must have a negative impact on the intention to use, only that this is not very significant, therefore bitcoin users do not consider its use risky (Gefen et al., 2003). The effect of trust on the intention to use is significant and its predictive relevance is high, thus proving to be a very important element when explaining the acceptance of bitcoin. Thus, it is recommended to integrate the elements of trust with the acceptance models in order to obtain concise models that better explain the emergence of cryptocurrencies, especially in the long term (López-Zambrano & Camberos-Castro, 2020).

With the growing impact that cryptocurrencies, and in particular Bitcoin, have had on the economy, by using an appropriate theoretical basis in the context of the user integrating theories, the applicability of the model can be expanded by doing so in new areas of knowledge, especially with methods of advanced statistical analysis (PLS-SEM). In this context, one of the contributions is the inclusion of perceived risk, since it shows a significant contribution to the theory since it is considered one of the main obstacles for the intention to use. Another relevant theoretical contribution is to show the existence of a decentralized currency, whose trust does not reside in a monetary authority or Central Bank, but in a Blockchain technology, which automatically records the value of transactions accurately, operated by expert individuals located on mining farms, and constitutes the most important element of structural guarantees (GE), which increases confidence in the use of bitcoin (Gefen et al., 2003).

To conclude, it is important to mention that the theory indicates that risk must be analyzed in a multidimensional way so that it provides more elements, in the case of cryptocurrencies it is not recommended, since the negative connotation is very insignificant (Featherman & Pavlou, 2003; Lee, 2009). Given that this study is cross-sectional, a longitudinal study could provide a greater scope in terms of the evolution of the factors over time, in addition to recommending studies in different regions and based on different types of cryptocurrencies in order to compare the results.

Currently, cryptocurrencies are receiving more and more attention, mainly bitcoin, which, in 2021, despite the crisis due to the pandemic, has reached all-time highs. Perhaps because bitcoin has existed since 2008, its acceptance and use have not yet been exhaustively evaluated, which is why this type of study is considered important. To this, it must be added that there is no research that analyzes the adoption of cryptocurrencies or bitcoin with second-generation statistical tests. To fill this gap and meet the objectives of this research, a model was formulated and tested which integrates multi-dimensional trust and perceived risk to measure intention to use. Statistical results indicate consistency and validity coupled with high predictive power by explaining 60.5 % of the variance of intention to use and 16.5 % of the actual use of bitcoin. Structural guarantees and familiarity are the most significant factors that explain trust and therefore the intention to use bitcoin, thereby fulfilling the objective of knowing that these elements are key to explaining the acceptance and use of bitcoin.

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Modeling and simulation of the operational risk of fiduciary institutions in Colombia

Modelaje y simulación del riesgo operativo de las instituciones fiduciarias en Colombia

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Abstract

Through this work, a model was developed that has become the first experience to measure and forecast the impact that net losses have had on operating risk in fiduciary companies in Colombia and that would allow fiduciary companies to study and analyze the evolution and impact that operating risk has on their profits. The financial services industry sector has been exposed to a number of risks that lead to losses in these entities, and in the financial system in general; thus, through the definition of operational risk and operational risk management, the study of risk indicators is implemented through the EaR (Risk Usability) methodology, established in three phases: on the one hand, the selection and compilation of the financial information of the fiduciaries to be studied; the determination of the financial statements, with the construction of the income statement, and ending with the determination of the probabilistic distribution that adapts to the historical information, to then determine the correlations between the determined accounts, in order to be able to establish the EaR through Monte Carlo simulations. In this way, it was possible not only to build a model to quantify operating risk, based on financial information on income and expenses, but also to obtain relevant statistical information on the impact of operating risk.

Resumen

Mediante este trabajo se desarrolló un modelo que se ha convertido en la primera experiencia para medir y estimar el impacto que han tenido las pérdidas netas en el riesgo operativo en las fiduciarias en Colombia y que permitiera a las fiduciarias estudiar y analizar la evolución y el impacto que tiene el riesgo operativo en sus utilidades. El sector de la industria de servicios financieros se ha visto expuesto a una cantidad de riesgos que conllevan a pérdidas en dichas entidades, y al sistema financiero en general; es así cómo a través de la definición de riesgo operativo, y la gestión de riesgo operacional, se implementa el estudio de indiciadores de riesgo a través de la metodología EaR (Utilidad de riesgo), establecido en tres fases: por un lado, la elección y recopilación de la información financiera de las fiduciarias a estudiar; la determinación de los estados financieros, con la construcción del estado de resultados, y finalizando con la determinación de la distribución probabilística que se adapta a la información histórica, para luego determinar las correlaciones entre las cuentas determinadas, para poder establecer el EaR a través de simulaciones de montecarlo. De esta manera, se ha podido no solo construir un modelo de cuantificación del riesgo operativo, a partir de la información financiera de ingresos y gastos, sino también obtener información estadística relevante sobre el impacto del riesgo operativo.

Keywords | palabras clave

Operational risk, trust companies, EaR, profits and losses.
Riesgo operativo, fiduciarias, EaR, utilidades y pérdidas.

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1. Introducción

Any organization regardless of the economic sector (industrial, services, or financial) is exposed to countless events that can affect its objectives and impede them from reaching the financial goals initially set. All of these situations, which are difficult to predict, are known as risks.

Due to the development of the financial services industry in the world, this sector has been increasingly exposed to a number of risks that entail losses for the entities themselves and the financial system in general. Among the most common risks are market risks, credit risks, liquidity risks, and operational risk could not be ignored; which, according to the survey of members of the British Bank Association, 67 % indicated that operational risk is much more significant than credit and market risks. In this same vein, operational risk has been considered by the Basel Committee as the risk that has caused the most losses to the financial system in the world (Basel, 2004). Likewise, (Yao et al., 2013, p. 16) indicate that an investigation carried out by the World Bank has shown that one of the most frequent causes for bankruptcy of the banking industry in the world has been operational risk.

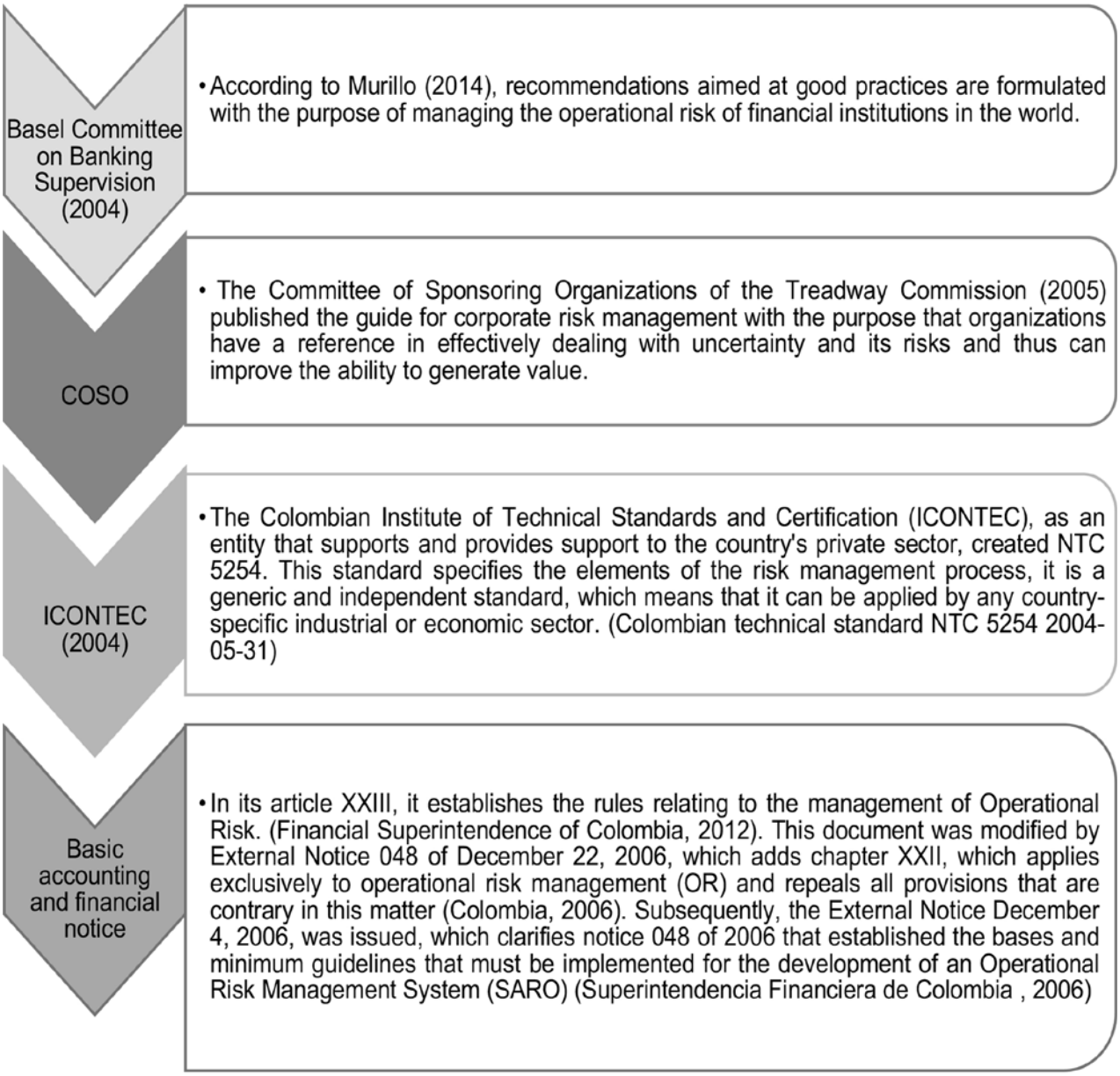
The operational risk, according to the Financial Superintendency of Colombia (2007) corresponds to "the possibility of incurring losses due to deficiencies, failures or inadequacies in human resources, processes, technology, infrastructure or due to the occurrence of external events"; including the legal and reputational risk associated with such factors. In this order of ideas, (Pinto & Leyva-Lemarie, 2008, p. 98), point out that the types of operational risks are the consequence of four conditions:

- People: internal fraud, employment practices, and job security.
- Processes: execution, delivery, and management of projects and/or clients, products, and commercial practices.
- Systems: interruption of operations or system failures.
- External: damage or loss of physical assets and/or external fraud.

In the particular case of Colombian banking entities, they recognize that operational risk management exceeds the simple requirement of supervisory authorities and becomes an opportunity to achieve organizational objectives and add value to the services they provide. According to Pinto (Pinto & Leyva-Lemarie, 2008), this opportunity also contributes to improving each of the processes of these institutions. Having made the above considerations, it is convenient to highlight the importance of trust entities in Colombia, since they have significant participation in the national financial industry. In the annual report published by the Colombian Financial Superintendency in 2018, the Colombian financial system reached a total asset level of $ 1715 billion, which is equivalent to approximately 1.8 times the Colombian GDP, of which $ 659 billion, that is, 38 % corresponds to credit institutions and in second place are Trust Companies with $ 529 billion, which means 31 % of the total Financial System (Asociación de Fiduciarias de Colombia, 2019).

Next, in Figure 1, the standards developed in Colombia and internationally that are the benchmarks for managing operational risk in fiduciary institutions are described.

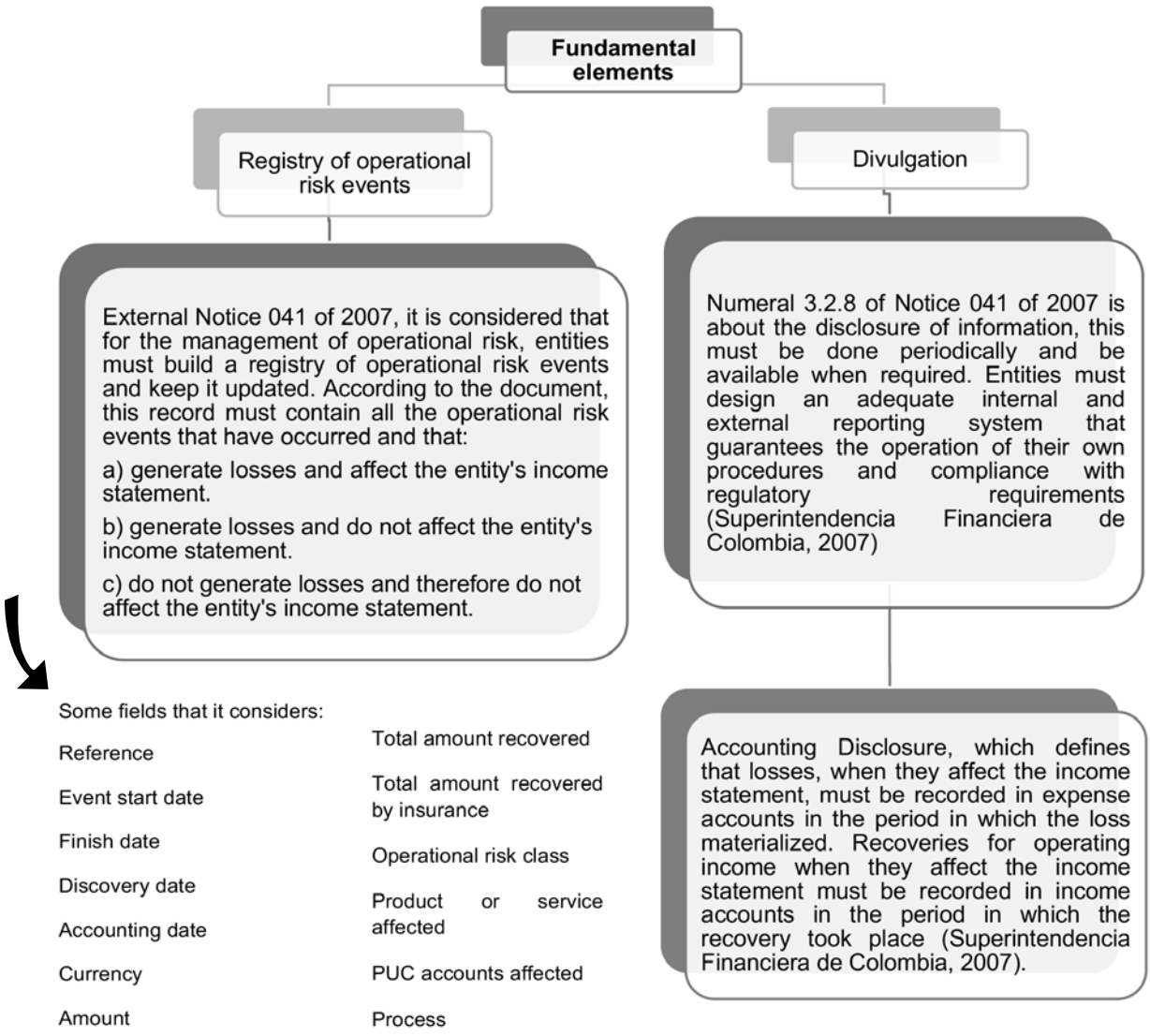
Figure 1. Standards developed to perform operational risk management



Source: Own elaboration

Any entity that is subject to the inspection and oversight of the Financial Superintendency of Colombia (SFC) must develop a SARO that allows them to effectively identify, measure, control, and monitor operational risk through elements such as policies, procedures, documentation, organizational structure, and even the registry of operational risk events (Superintendencia Financiera de Colombia, 2007). Thus, for the research carried out, two fundamental elements were taken into account, which are presented in Figure 2.

Figure 2. Fundamental elements to consider



Source: Own elaboration

After the above, it should be noted that there are different methodologies for quantifying operational risk in fiduciaries. These include the following:

a) Value at Risk VaR: according to (Triana et al., 2018, p. 174) it is a "statistical technique that allows to measure and quantify the exposure to market risk, defining the maximum potential loss that an asset can suffer or a portfolio of assets for a period of time and a certain level of confidence".

b) The Loss Distribution Approach (LDA) method: according to (Macías-Villalba et al., 2018, p. 13) "It is a statistical technique that aims to determine the distribution function of aggregate losses. This model is built on the information of recorded historical losses and has its origin in applications in the insurance industry".

c) The Bayesian Networks: (Dávila-Aragón & Ortiz-Arango, 2019, p. 34) comments that "Bayesian models are models of causality, which indicates that it is a man-

agement instrument used to predict the different courses of action and intervention. In these models, the cause-and-effect relationship is maintained between the different variables of the OR to reduce it, manage it and control it". It is important to mention that these models not only focus on quantifying it, but it is also essential to understand the causes of OR and the way in which loss events are reached.

In the same order and direction (Dávila-Aragón & Ortiz-Arango, 2019, p.33) indicate that:

> Bayesian networks are a viable alternative for risk analysis under insufficient information conditions and incorporate information through a priori probability distribution, which makes it possible to incorporate subjective data in decision-making and expert opinions and analysts' judgment.

For his part, (Holder Bonin, 2007, p. 928), establishes that:

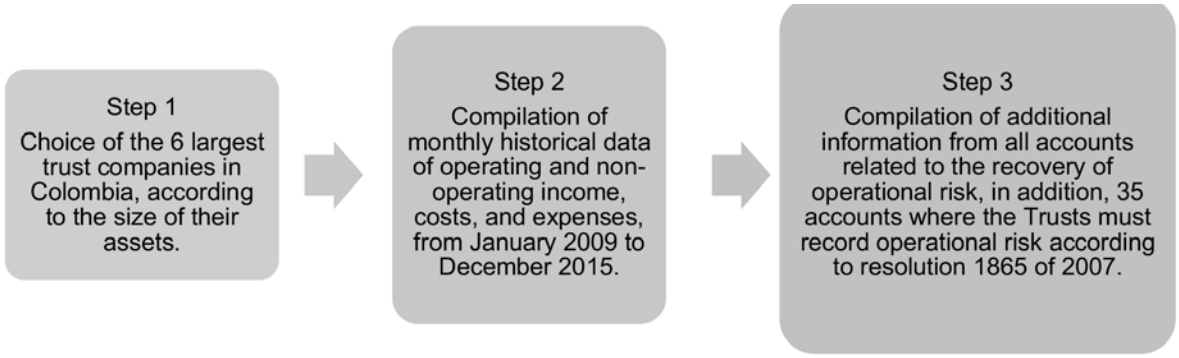
> … The EaR methodology measures the amount of earnings at risk and the net income that could change, as well as the VaR, also this measurement is considered a risk measure and is closely linked to the calculated value of the maximum risk loss in a horizon time and under a certain level of confidence. The difference is that while VaR analyzes the change in the total value in the period considered. EaR looks at possible changes in cash flows or earnings.

2. Methodology

According to the Association of Fiduciaries of Colombia and the Financial Superintendence of Colombia (SFC), Colombia has 23,809 trust businesses, of which, according to the assets managed as of the date of this study, six main ones stand out, representing more than 50 % of total assets (Asofiduciarias, 2019) (Castilla, 2019). This is how, to carry out the study, the choice of the following Trusts was considered: Fiduciaria Bancolombia S.A, Previsora S.A, Bogotá S.A, Fiduoccidente S.A, Fiduskandia S.A, and Fiduciaria Davivienda; applying the study in three phases, which are presented in the following figure:

Figure 3. Phase I of the methodology: Selection and collection of information

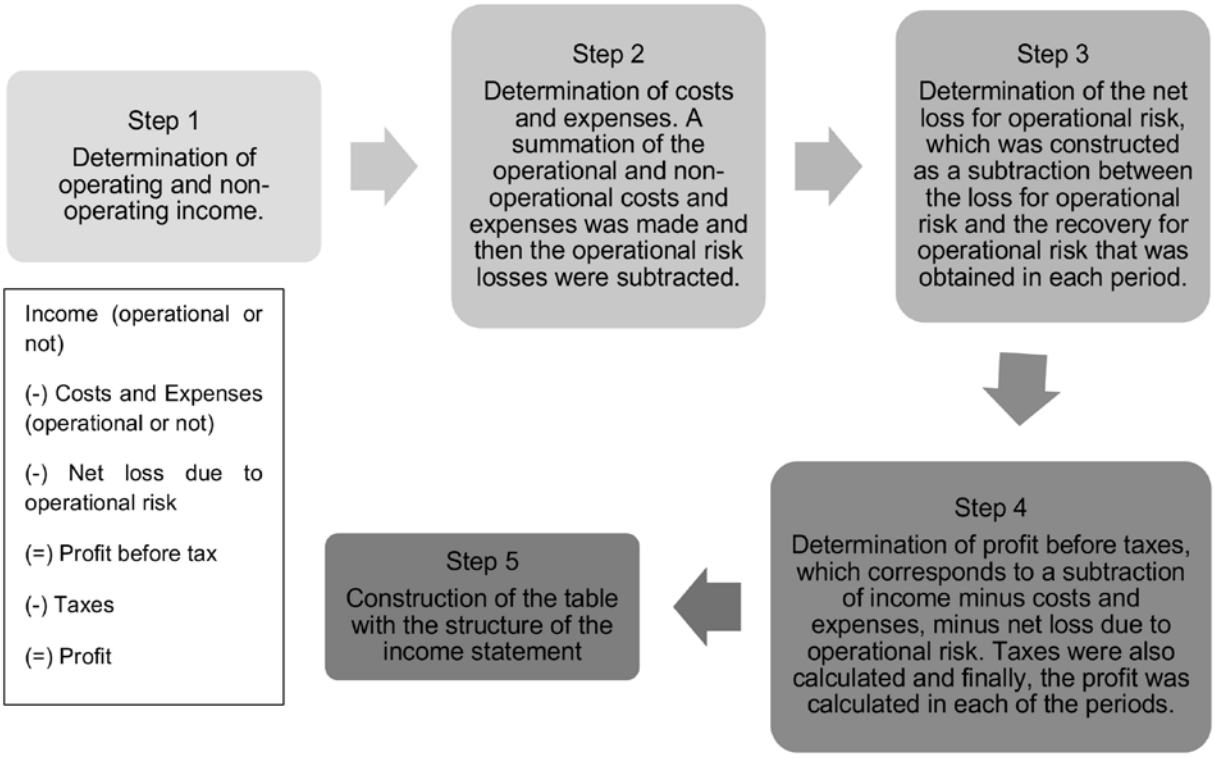
Phase I:



Source: Own elaboration

Figure 4. Phase II of the methodology: Determination of the income statement

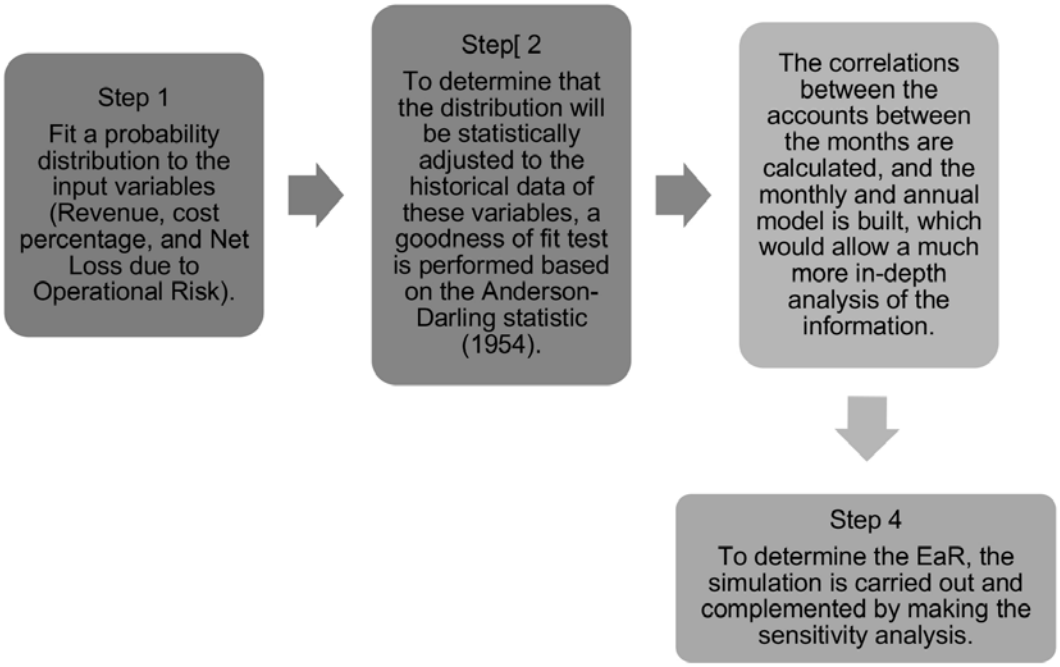
Phase II:



Source: Own elaboration

Figure 5. Phase III of the methodology: Probability Distribution and Monte Carlo Simulation

Phase III:



Source: Own elaboration

3. Results

3.1. *Results of net losses due to operational risk in relation to income and gross profit*

Table 1 shows the net operating risk losses, expressed in thousands of pesos. The net loss obtained by each trust company between the years 2009-2015 are linked together, extracted from the public information of the Financial Superintendence of Colombia (SFC, 2019) and the general average is calculated for each of the years. The red color indicates that said loss was above the general average obtained in that year and the green color indicates that said loss was below the general average in that year.

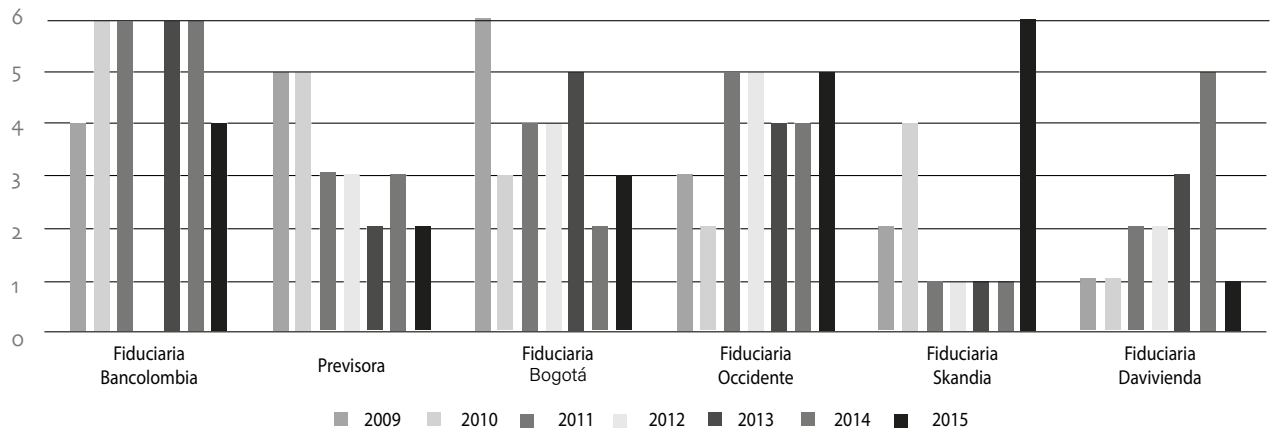
Table 1. Annual Account: Net losses due to operational risk (Values in dollars)

	2009	2010	2011	2012	2013	2014	2015
Fiduciaria Bancolombia	1 115 363,81	853 781,31	1 325 474,61	1 651 038,19	1 683 615,99	6 123 025,00	918 042,99
Previsora	2 436 958,68	548 629,72	117 149,60	752 757,32	251 944,72	272 394,67	126 548,49
Fiduciaria Bogotá	69 798 506,14	385 539,28	217 362,57	794 774,83	800 316,07	241 349,28	181 398,53
Fiduciaria Occidente	496 553,52	281 904,96	771 278,45	897 949,22	485 235,03	391 083,03	930 909,28
Fiduciaria Skandia	88 237,70	424 923,75	-219 854,64	81 538,99	-6173,62	69 948,63	1 149 615,19
Fiduciaria Davivienda	959,00	44 880,27	31 939,81	116 631,49	283 501,04	621 780,97	110 913,95
Average	12 322 763,14	423 276,55	373 891,73	715 781,67	583 073,21	1 286 596,93	569 571,41

Source: Own elaboration, extracted from the public data of the Financial Superintendency of Colombia.

Figure 6 shows a ranking of the net operating risk loss of the trust companies.

Figure 6. Fiduciary operational risk net loss hierarchy



A score of 6 is an indicator of the maximum net loss due to operational risk, a score of 1 is an indicator of the minimum net loss due to operational risk.

Source: Own elaboration

In Figure 6 a ranking of the net loss due to the operational risk of the trusts is made. With 6 being the maximum net loss due to operational risk and 1 being the lowest net loss due to operational risk of the 6. In the case of Bancolombia's fiduciary, in 2009 it obtained the 4th highest loss, but between 2010 and 2014 it was the fiduciary that had the highest loss due to operational risk, occupying the 6th position.

From the values present in the table and the behavior seen in figure 6, it can be highlighted that:

a) The fiduciary Bancolombia for six years had a net loss for operating risk above the average, only in 2009 it was below the average. This trust obtained the largest loss of the six companies analyzed for five consecutive years (2010 to 2014) since it obtained a score of 6. Taking into account the above situation, one might think that the Bancolombia trust is the riskiest, but there are It must be borne in mind that this companyis the largest of all, if it is analyzed from the point of view of assets. The previous analysis establishes the need to create indicators that allow for deeper analysis and especially allow for aggregate analysis since the differences in size of the trust companies in Colombia would prevent reaching much more forceful conclusions.

b) Davivienda fiduciary presented a loss for operational risk below the general average of all years, which shows that it is the best in the management of operational risk. Additionally, in Figure 6, the ranking of the operational risk of this company shows that in 2009 and 2010 it was the one with the lowest loss due to operational risk and is growing in an ascending manner until it becomes the second with the highest loss due to operational risk among the six companies analyzed.

c) The Skandia fiduciary, for four consecutive years, presented operating risk losses below the average; even in 2010, said loss exceeded the average, but for a very small value ($ 1,647 million). Only in 2015, it obtained a significant net loss for operational risk and much higher than the average, which was $ 1,149,615.

On the other hand, table 2 shows the relationship between the net losses due to operational risk and the income of the six analyzed companies. This information is important since it allows quantifying the impact that operational risk losses have on the income of the six main trust companies in Colombia.

Table 2. Net operating risk losses/Income

	2009	2010	2011	2012	2013	2014	2015
Fiduciaria Bancolombia	0,56 %	0,45 %	0,62 %	0,70 %	0,75 %	2,61 %	0,35 %
Previsora	2,10 %	0,45 %	0,08 %	0,42 %	0,12 %	0,14 %	0,06 %
Fiduciaria Bogotá	34,03 %	0,32 %	0,17 %	0,55 %	0,55 %	0,15 %	0,10 %
Fiduciaria Occidente	0,77 %	0,43 %	1,14 %	1,10 %	0,59 %	0,44 %	1,02 %
Fiduciaria Skandia	0,77 %	2,06 %	-1,94 %	0,92 %	-0,02 %	0,20 %	2,70 %
Fiduciaria Davivienda	0,00 %	0,15 %	0,10 %	0,18 %	0,36 %	0,69 %	0,12 %
Average	6,37 %	0,64 %	0,03 %	0,65 %	0,39 %	0,70 %	0,73 %

Source: Own elaboration

In order to correctly interpret the data of each one of the companies analyzed during the seven years, the following case is explained: for Previsora in 2009, it showed a value of 2.10 % which indicates that for each peso of income, 2.10 cents of loss for operational risk were obtained. Taking into account the previous explanation, the following can be said in general terms:

a) The impact that the loss of operational risk had on the income of all trust companies is not high, since the percentage was mostly below 1 %.

b) The most significant event was presented with the Bogota trust company in 2009, where the great impact of the millionaire embezzlement case suffered by this financial entity is evidenced. For each peso that it obtained in income, the Bogotá company presented an operating risk loss of 34.03 cents. This shows that unexpected events of this magnitude significantly affect trust companies.

c) In 2010 and 2014, five of the six trust companies obtained an operating risk loss in relation to the income below the average in those years.

d) The Occidente fiduciary experienced an operating risk loss above the average for four years, which indicates that it is the most affected trust in income from losses related to operating risk.

e) Davivienda fiduciary is the company where its income has been least affected since six of the seven analyzed years said indicator was below the average; adding that in 2009 this indicator was 0%.

f) It is important to mention the evolution of the net losses due to operational risk in relation to the income of the Previsora trust company, where it is possible to observe a decrease in recent years in relation to 2009, which is very positive for said company. The opposite case has been experienced by Davivienda, given that for four consecutive years this loss was increasing and only decreased in the last year of the analysis.

Additionally, Table 3 shows the relationship between the net losses due to operational risk and the profit of the six analyzed fiduciaries. This information is important since it allows quantifying the impact that operational risk losses have on the profit of the six main trust companies in Colombia.

Table 3. Net Loss due to Operational Risk/Net Income

	2009	2010	2011	2012	2013	2014	2015
Fiduciaria Bancolombia	1,31 %	1,16 %	1,67 %	2,02 %	2,86 %	10,23 %	0,99 %
Previsora	8,37 %	1,63 %	0,29 %	1,43 %	0,47 %	0,75 %	0,42 %
Fiduciaria Bogotá	192,17 %	0,90 %	0,45 %	1,37 %	1,53 %	0,41 %	0,27 %
Fiduciaria Occidente	1,93 %	0,99 %	2,72 %	2,74 %	1,60 %	1,22 %	2,58 %
Fiduciaria Skandia	1,38 %	2,95 %	-4,90 %	14,98 %	-0,02 %	0,37 %	4,78 %
Fiduciaria Davivienda	0,01 %	0,30 %	0,21 %	0,43 %	1,34 %	2,66 %	0,42 %
Average	34,19 %	1,32 %	0,07 %	3,83 %	1,30 %	2,61 %	1,58 %

Source: Own elaboration

To correctly interpret the data of each of the fiduciaries in the seven analyzed years, the following case is explained: for the Skandia Fiduciary in 2009 it presented a value of 1.38% which indicates that for each peso of net profit obtained by this fiduciary, had 1.38 cents of loss for operational risk. In the case of the Previsora fiduciary, the loss in relation to profit was below the average in relation to the other analyzed fiduciaries.

4. Calculation of EaR

The Anderson-Darling (1954) goodness-of-fit test was used to determine the probability distribution that best adjusted to each of the variables selected for the model (income, percentage of costs, and net loss due to exploitation risk). When some of the variables did not fit the theoretical distributions, they fit the empirical distribution, that is, a distribution that uses the same data to predict their future behavior. This distribution was built with the help of the @Risk software and is called the RiskGeneral function.

For the construction of the RiskGeneral function, the minimum value, the maximum value, the class, and the frequency of the historical data of the variable are required. This is obtained from the data analysis tool, frequency histogram, offered by Microsoft Excel. The results are presented in Table 4:

Table 4. Probability distribution according to the variable

Variable Fiduciary	Income	% of costs	Net loss from operational risks
Bancolombia	Logistic	Normal	RiskGeneral
Previsora	Rayleigh	Pert	RiskGeneral
Bogotá	Loglogistic	Laplace	RiskGeneral
Occidente	RiskGeneral	RiskGeneral	RiskGeneral
Skandia	RiskGeneral	Cauchy	RiskGeneral
Davivienda	RiskGeneral	RiskGeneral	RiskGeneral

Source: Own elaboration

Once the probability distributions for each variable have been defined, we proceed to build the monthly and annual Monte Carlo simulation model. Before indicating the results of the monthly simulation, the following terms must be defined:

a. Income: is the random number generated taking into account the distribution adjusted to the historical income data that depends on the correlation between the accounts.

b. Expenses: it is obtained from the multiplication between the income with the random number generated by the distribution adjusted to the % of historical expense that depends on the correlation between the accounts.

c. Loss due to operational risk: it is a random number generated by the adjusted distribution of the historical net loss that depends on the correlation between the accounts.

d. Profit before taxes: these are income minus expenses minus the net loss due to operational risk.

e. Taxes: % of taxes is the result of the historical average of the entity for the profit before taxes.

f. Profit: It is the difference between profit before taxes and taxes. This is considered the output variable of the model.

For the monthly simulation model, the correlation matrix between the income accounts, % of costs and expenses, and net loss due to operational risk are calculated to consider the effect of the relationships with the analyzed concepts, and the simulation model is built as detailed in table 5.

Table 5. Monthly simulation model

Income statement per month (thousands)	Month
Income	7 290 511 679
Expenses	6 569 686 027
Net loss due to operational risk	6 706 050
Profit before tax	714 119 602
Tax	160 056 478
Profit	554 063 124

Source: Own elaboration

The annual simulation model was built to determine the net losses of operational risk projected for the next year and thus be able to analyze its effect on the profits of the main trust companies in Colombia (Boada, 2016; 2000).

Before indicating the results of the annual simulation, the following terms must be defined:

a) Income: it is obtained by adding the monthly income and at the same time they are random numbers generated by the distribution adjusted to the historical income data that depends on the correlation between the values of the months of the income.

b) Expenses: is the sum of the monthly expenses that are calculated as the multiplication between the income with the random number generated by the distribution adjusted to the historical % of expenses that includes the correlation between the values of the months of the % of expense.

c) Loss due to operational risk: it is the sum of the monthly net losses that are a random number generated by the distribution adjusted to the data of the historical net loss that depends on the correlation between the values of the months of the net losses due to operational risk. Additionally, it is an output variable of the simulation model.

d) Profit before tax: income minus expenses minus net loss due to operational risk.

e) Tax: % of tax determined as the historical average of the entity by the profit before tax

f) Profit: is the difference between profit before tax and the tax accounting field. It is the output variable of the model.

For the annual simulation model, it is detailed in table 6.

Table 6. Annual simulation model

Income statement per month (thousands)	Month 1	...	Month 12	Total anual
Income	1 136 376 631	...	2 008 240 701	24 276 929 765
Expenses	993 380 209	...	1 990 081 292	20 863 725 938
Net loss due to operational risk	6 291 486	...	7 562 810	94 544 463
Profit before tax	136 704 936	...	10 596 599	3 318 659 364
Tax	30 639 840	...	2 375 028	761 358 364
Profit	106 065 096	...	8 221 571	2 557 301 000

Source: Own elaboration

Subsequently, 10,000 iterations are carried out in order to project the profits and net losses due to operational risk for the next period and thus be able to calculate the EaR. These results can be seen in table 7.

Table 7. Results of the Monte Carlo Fiduciary simulation (data in thousands of pesos)

Monthly simulation - profit	Statistical	Fiduciaria Bancolombia	Fiduciaria Bogotá	Fiduciaria Davivienda	Fiduciaria Occidente	Fiduciaria Previsora	Fiduciaria Skandia
	Mean	6 172 231	1 414 195	1 399 294	1 853 008	3 269 932	383 154
	Deviation	1 465 692	2 439 069	856 552	1 977 233	1 706.255	998 729
	Minimum	1 667 545	-6 261 563	-4 889 273	-1 244 429	-451 879	-2 290 680
	Maximum	13 430 891	168 368 182	5 080 686	10 202 715	11 453 492	12 268 919
	P (Profit> 0)	100 %	100 %	98,64 %	100 %	99,94 %	100 %
	5% percentile	3 895 567	294 927	444 551	92.400	942.576	-438.923
	95% percentile	8 651 850	3.342.678	3 018 555	6 630 626	6 444 574	2 180 373
	EaR	2 276 664	1 119 268	954 743	1 760 608	2 327 355	822 077
Annual simulation by profit	Statistical	Fiduciaria Bancolombia	Fiduciaria Bogotá	Fiduciaria Davivienda	Fiduciaria Occidente	Fiduciaria Previsora	Fiduciaria Skandia
	Mean	74 348 111	15 374 774	19 060 003	18 769 632	38 720 471	2 208 622
	Deviation	5 881 965	8 124 479	11 215 543	6 790 635	14 747 746	2 980 780
	Minimum	50 407 468	1 560 494	-27 704 516	1 664 210	4 710 893	-13 468 835
	Maximum	97 439 202	234 492 625	63 319 898	55 536 072	126 514 241	29 281 400
	P (Profit> 0)	100 %	100 %	99,59 %	100 %	99,90 %	100 %
	5% percentile	64 826 070	8 893 163	5 513 253	10 092 975	18 283 094	-1 482 686
	95% percentile	84 260 990	27 195 695	40 174 498	31 759 286	65 886 988	7 774 180
	EaR	9 522 041	6 481 612	13 546 750	8 676 657	20 437 377	3 691 308

Monthly simulation - profit	Statistical	Fiduciaria Bancolombia	Fiduciaria Bogotá	Fiduciaria Davivienda	Fiduciaria Occidente	Fiduciaria Previsora	Fiduciaria Skandia
Annual simulation by profit	Statistical	Fiduciaria Bancolombia	Fiduciaria Bogotá	Fiduciaria Davivienda	Fiduciaria Occidente	Fiduciaria Previsora	Fiduciaria Skandia
	Mean	4 852 462	1 308 648	725 839	1 584 748	1 881 476	1 316 015
	Deviation	2 931 524	318 724	170 927	442 404	2 384 107	271 776
	Minimum	-12 965 405	374.347	43 263	504 631	-13 291 688	391 939
	Maximum	13 676 910	3 723 802	1 952 573	5 234.297	12 044.335	2 848 356
	P (Profit> 0)	93,76 %	100 %	100 %	100 %	60,53 %	100 %
	5% percentile	-811 522	970 497	506 700	1 049 374	-1 490 043	924 501
	95% percentile	9 028 892	1 897 913	1 061 698	2 387 062	6 047 108	1 830 758

Source: Own elaboration

In accordance with the previous results and considering table 7, the following is found:

a) For the Bancolombia trust, the expected value of the profit is estimated at $ 6172 million, which may decrease to $ 3895 million with 95 % confidence; therefore, the maximum monthly profit loss for Bancolombia at 95 % confidence is EaR $ 2,276 million. In annual terms, a profit of $ 74,348 million is expected with an EaR $ 9,522 million, although there is a 100 % probability that next year's profits will be greater than zero. On the other hand, the net losses due to operational risk for the next year are expected to have a value $ 4852 million with a maximum probable loss at a confidence level of 95 % of $ 9028 million, which is the value that must be provisioned for those events that directly affect the expense of the income statement.

b) For the Bogotá fiduciary, the expected value of the profit for the next month is $ 1,414 million, which can decrease to $ 294 million with 95% confidence, therefore, the maximum loss of profit for the Bogotá fiduciary to a 95 % confidence is EaR $ 1,119 million. In annual terms, a profit of $ 15,374 million is expected with an EaR $ 6,481 million, which is the value that the profits can fall from the value that is expected to be obtained, although there is a 100 % probability that the profits of next year will be greater than zero. On the other hand, the net losses due to operational risk for the next year are expected to have a value of $ 1308 million with a maximum probable loss at a confidence level of 95% of $ 1897 million, which is the value that must be provisioned for those events that directly affect the expense of the income statement.

c) For the Davivienda trust company, the expected value of the profit for the next month is $ 1,399 million, which may decrease to $ 444 million with 95% confidence, therefore, the maximum profit loss for the Davivienda trust company at a 95% confidence is EaR $ 9.54 million. In annual terms, a profit of $ 19,060 million is expected with an EaR of $ 13,546 million, which is the value that the profits can fall from the value that is expected to be obtained, although there is a probability of 99.59 % of the profits of next year being greater than zero. the net losses due to operational risk for the next year are expected to have a value of $ 725 million with a maximum probable loss at a 95 % confidence level of $

1061 million, which is the value that must be provisioned for those events that directly affect the expense of the income statement.

d) For the Occidente fiduciary, the expected value of the profit for the next month is $ 1853 million, which may decrease to $ 92 million with 95 % confidence, therefore, the maximum loss of profit for the Occidente fiduciary at 95 % confidence is EaR $ 1.76 billion. In annual terms, a profit of $ 18,769 million is expected with an EaR $ 8,676 million, which is the value that the profits can fall from the value that is expected to be obtained, although there is a 100 % probability that the profits of next year will be greater than zero. On the other hand, the net losses due to operational risk for the next year are expected to have a value of $ 1,584 million with a maximum probable loss at a confidence level of 95 % of $ 2,387 million, which is the value that must be provisioned for those events that directly affect the expense of the income statement.

e) For the Previsora fiduciary, the expected value of the profit for the next month is $ 3,269 million, which can decrease to $ 942 million with 95% confidence, therefore, the maximum loss of profit for the Western fiduciary at a 95% confidence is EaR $ 2.327 million. In annual terms, a profit of $ 38,720 million is expected with an EaR of $ 20,437 million, which is the value that the profits may fall from the value that is expected to be obtained, although there is a probability of 99.90% of the profits of the next year is greater than zero. On the other hand, the net losses due to operational risk for the next year are expected to have a value of $ 1,881 million with a maximum probable loss at a confidence level of 95 % of $ 6,047 million, which is the value that must be provisioned for those events that directly affect the expense of the income statement.

f) For the Skandia fiduciary, the expected value of the profit for the next month is $ 383,154 million, which can decrease to $ 438,923 million with 95% confidence, therefore, the maximum loss of profit for the fiduciary of Skandia at 95% confidence is EaR $ 822,077 million. In annual terms, a profit of $ 2208 million is expected with an EaR $ 3691 million, which is the value that the profits can fall from the value that is expected to be obtained, although there is a 100 % probability that the profits of next year will be greater than zero. On the other hand, On the other hand, the net losses due to operational risk for the next year are expected to have a value of $ 1,881 million with a maximum probable loss at a confidence level of $ 1,316 million with a maximum probable loss at a confidence level of 95 % of $ 1,830 million, which is the value that must be provisioned for those events that directly affect the expense of the income statement.

5. Sensitivity analysis

Likewise, a sensitivity analysis was carried out, through the Tornado Analysis technique, used by the Risk Simulator software and documented in the document entitled*: Use of Risk Simulator® as a tool for valuation of comparable multiples. Case of companies in the Colombian electricity sector* (Boada, 2016), where it is possible to determine the level of variability of the model based on the fluctuation of the input variables, by + 10 %, which allowed quantifying the impact of net losses due to operational risk in the monthly profits of the six chosen fiduciaries.

Then, with this analysis, the correlation coefficient between the net loss due to operational risk and the profit was calculated, presented in Table 8 for the analyzed six fiduciaries.

Table 8. Result of the Sensitivity Analysis for the Fiduciaries

Fiduciary	Correlation coefficient
Bancolombia	-0,11
Bogotá	-0,11
Davivienda	0,23
Occidente	0,12
Previsora	-0,19
Skandia	0,13

Source: Own elaboration

For the case presented, the relationship between the net loss due to operational risk and the profit was small, which corroborates the historical analysis carried out; therefore, operational risk losses that affect the income statement do not have a significant effect on the companies' profits. While, on the other hand, the factors that most affected profits were the income and expenses of the companies.

Finally, it was observed that the fiduciaries Bancolombia, Bogotá, Previsora present negative correlation coefficients, with Previsora being the entity in which the loss for operational risk has a greater effect since it has a greater correlation coefficient -0.19 and Bancolombia and Bogotá are the fiduciary companies with a lower effect since their coefficients are -0.11 for both.

6. Conclusions and recommendations

The questions that we wanted to answer at the end of this article were: How could the Operational Risk losses of Trust institutions in Colombia be modeled based on the accounting disclosure requirement of the SARO? and how could the impact of Operational Risk be projected on the profits of Trust Institutions in Colombia?

The most significant result achieved in the research on the six largest fiduciaries in Colombia was the construction of a model that would allow the measurement and quantification of operational risk based on the financial information provided by the financial superintendency of Colombia on income, costs, and expenses and on net monthly operational risk losses during the period 2009-2015.

The construction of the Montecarlo simulation model allowed obtaining important statistical information on the impact that operational risk has on trust companies in Colombia. As a conclusion, it can be mentioned that, on average, the six trust companies had an expected value of the annual profit of $ 27,397,864.55, with the Bancolombia trust the one that obtained an expected value greater than $ 74,348,111.42. It is also important to mention that there is a high probability of obtaining a profit greater than 0 in the six analyzed fiduciaries.

The simulation made it possible to calculate the monthly and annual EaR for each of the analyzed fiduciaries. In annual terms, the trust with the highest maximum loss in profit was Previsora with $ 20,437,377 and the one with the lowest maximum loss was Bogotá with a value of $ 6,481,612. It is important to clarify that Bancolombia, being the largest of the sample was within the range with a maximum profit loss of $ 9,522,041.

According to historical data obtained from the Financial Superintendency from 2009-2015, the impact of net losses due to operational risk ranges from 0.03 % to 0.73 % of companies' income. It is important to mention that this indicator increased significantly in 2009, reaching 6.37%, due to the event that occurred in the Bogota trust company. Additionally, the impact that net losses due to operational risk had on the profit of the trust companies had a similar movement, since it moved between 0.07 % and 3.83 %, making it once again clear that said indicator had an increase in 2009 significant going to 34.19 % in the case of the Bogota trust company.

For the Colombian case, this research becomes the first experience in calculating and measuring the impact that net losses on operational risk have had on trust companies in Colombia. Since there is evidence in other sectors such as the energy and banking sectors, but not in the Colombian trust companies, which may be the basis for carrying out this type of work with the same trust companies and even include others that were not taken into account by the criteria adopted in this work.

As a final recommendation, this type of simulation models and procedures, supported by computer programs, offer a perspective to analyze the behavior of a system in different circumstances and generate skills in a controlled environment (Uribe-Gómez & Quintero-Ramírez, 2017). This is interesting for trusts, and even supervisory authorities, in order to develop techniques, tools, strategies, and mechanisms that make it possible to assess operational risk losses and subsequently establish strategies to establish policies to reduce such potential losses.

It is important to indicate to the reader that this research was conducted in Colombia, taking into consideration the Colombian financial environment, dominated by the Colombian peso as the local currency. Likewise, the study reflects an exhaustive analysis carried out between 2009 and 2015, establishing a financial modeling proposal based on the numerical information collected from fiduciary institutions in Colombia, in order to establish the EaR (Risk Utility) through Monte Carlo simulations. In this way, given the scope of the study presented, the possibility of future work is to carry out comparative studies between the modeling and simulation carried out with the financial information presented as of 2020.

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Profitability, indebtedness and liquidity analysis of microenterprises in Ecuador

Análisis de rentabilidad, endeudamiento y liquidez de microempresas en Ecuador

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Abstract

Microenterprises are an important factor in Ecuador's economic development. This research analyzes and compares financial indicators such as financial profitability, indebtedness and current liquidity of microenterprises in the province of Guayas with those in other provinces of Ecuador. The analysis used a quantitative methodology of descriptive type of cross-sectional design for 13,768 microenterprises in the province of Guayas and 16,093 microenterprises in the rest of the provinces of Ecuador that reported their financial statements to the Superintendence of Companies, Securities and Insurance as of 2019. To compare these groups, a t-test was performed for independent samples with unequal variances. The results of this research indicate that, with a 95% confidence level, average indebtedness and average current liquidity are higher in the province of Guayas while microenterprises in the rest of Ecuador report better average financial profitability. Although Guayas province has the highest percentage of microenterprises in the country, this is not a sufficient condition to conclude that its financial indicators, on average, are better than those of the rest of Ecuador. This research aims to make a contribution to the development of lines of work that contribute to the elaboration and design of policies that help the survival and business performance of microenterprises.

Resumen

Las microempresas representan un componente significativo para el progreso económico de Ecuador. Esta investigación analiza y compara indicadores financieros como la rentabilidad financiera, el endeudamiento y la liquidez corriente de las microempresas de la provincia del Guayas con las del resto de provincias de Ecuador. El análisis utilizó una metodología cuantitativa de tipo descriptiva de diseño transversal para 13 768 microempresas de la provincia del Guayas y 16 093 microempresas del resto de las provincias de Ecuador que reportaron su información financiera a la Superintendencia de Compañías, Valores y Seguros al año 2019. Para comparar estos grupos se realizó una prueba t para muestras independientes con varianzas desiguales. Los resultados de esta investigación indican que, con un nivel de confianza del 95 %, el promedio de endeudamiento y la liquidez corriente media son mayores en la provincia del Guayas mientras que las microempresas del resto de Ecuador reportan una mejor rentabilidad financiera promedio. A pesar de que la provincia del Guayas tiene el mayor porcentaje de microempresas en el país, no es condición suficiente para concluir que sus indicadores financieros, en promedio, son mejores que los del resto de Ecuador. Esta investigación pretende ser un aporte al desarrollo de líneas de trabajo que contribuyan a la elaboración y diseño de políticas que ayuden a la supervivencia y desempeño empresarial de las microempresas.

Keywords | palabras clave

Financial ratio, Student's t-test, profitability, microenterprises, business performance, corporate liquidity, indebtedness, finance.
Ratio financiero, prueba t de Student, rentabilidad, microempresas, desempeño empresarial, liquidez corriente, endeudamiento, finanzas.

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1. Introduction

Microenterprises are defined as small organizations managed by their owners, normally they are created by a member of a marginalized and vulnerable segment of the population that, in order to face capital limitations, lack of access to credit, and barriers to entry, adopt various organizational forms (González-Sánchez & Méndez-Vásquez, 2017; Muñoz et al., 2014). Often, the creation of these organizations is done empirically, that is, without the knowledge or experience necessary to evolve in a highly competitive market, resulting in a high rate of business failure in these companies when compared to those of larger size (Blázquez-Santana et al., 2006).

For Okurut (2008), microenterprises belong to the category of survival businesses, since their owners have the expectation of finding a formal job that allows them to improve the minimum income that their businesses produce, which would generate a competitive disadvantage compared to companies of big size. Authors such as Ampudia-Márquez (2008), Díaz-Arreguín (2010), Mungaray-Lagarda and Urquidy (2007) argue that despite the fact that impact policies have been developed for microenterprises, they tend to be of low transcendence since they do not respond to the demands of the sector.

The role of microenterprises is essential both in emerging societies and in societies with buoyant economies, which has allowed them to progress despite the limited support of government, commercial and financial organizations (de Jorge-Moreno et al., 2010; De Zoysa & Kanthi-Herath, 2007; Halabi et al., 2010; Steinerowska-Streb, 2012). These companies have contributed to job creation by offering opportunities to those who cannot find it while helping to reduce poverty rates thanks to their profitability (Rogerson, 2004; Zainol et al., 2017).

By their nature, microenterprises offer more affordable goods and services to the community because they tend to have a lower price (Rodríguez-Arrieta et al., 2019). Given the positive impact of microenterprises and the limited studies on their performance, the objective of this research work is to carry out a statistical comparison of the financial performance, level of debt to third parties, and current liquidity of microenterprises in the province of Guayas with the rest of the provinces of Ecuador. This study contributes to the literature, as it examines the financial behavior of microenterprises in an emerging country. Typically, studies of this type have been carried out in the context of the United States, Malaysia, Sweden, Poland, Uganda, Nigeria, Peru, and other countries (Adekunle, 2011; Janda et al., 2013; Muñoz et al., 2014; Rasiah et al., 2014; Schreiner & Woller, 2003; Ssebunya et al., 2019; Yazdanfar et al., 2013; Vargas-Vega et al., 2020).

The investigation is structured as follows. After a brief introduction, a summary of the existing literature is presented, where the antecedents of previous investigations that gave the guideline to carry out this investigation are presented. In addition to listing the assumptions or hypotheses to be tested.

The following section explains the selection of the sample and the used methodology, which is quantitative of a descriptive type of cross-sectional design, in order to analyze and compare the indicators of profitability, indebtedness, and liquidity, which are key in the studies of profitability of microenterprises. Next, the results of the investigation for the indexes of financial profitability, indebtedness, and solvency in the short term of the microenterprises of the province of Guayas and how these compare with those of the rest of the provinces of Ecuador are show. Finally, the general conclusions of the study are presented.

1.1. Literature review

Researchers in business dynamics, industrial economics, strategic management, accounting, and finance have attempted to identify sources of variation in business profitability (Goddard, Tavakoli, & Wilson, 2005). Different authors (Aulová et al., 2019; Floros & Voulgaris, 2016; Lososová & Zdeněk, 2014; Prijadi & Desiana, 2017; Rasiah et al., 2014; Spitsin et al., 2020) have proposed their theories about profitability in companies and their determinants applied to different societies, sectors, and approaches. For example, economic factors of business performance (external to the organization) and organizational factors (financial behavior of the company and suitability of the environment) have shown in previous research that they operate independently and that internal factors are more significantly and directly associated to business performance (Appiah-Adu et al., 2001). In fact, Muñoz et al. (2014) indicate that business performance was scarcely or not at all influenced by factors exogenous to the organization, but there is a moderate incidence between company-specific factors such as financial indicators, seniority, size, and managerial capabilities and the company's earnings. On the other hand, other authors (Floros & Voulgaris, 2016; Jasiniak & Pastusiak, 2014; Zeli & Mariani, 2009) argue that external factors such as the sector to which the firm belongs and its competitiveness are variables that significantly affect the generation of profitability.

Regarding the incidence of company-specific factors such as financial indicators, Goddard et al. (2005), Jinchuña-Huallpa (2021), and Campuzano and Rodríguez (2018) concluded that the leverage ratio of a firm and its profitability is negative but that there are companies that have greater liquidity and tend to be more profitable. Along the same lines, (Castillo-Valero & García-Cortijo, 2013; González-Pérez et al., 2002; Lin & Rowe, 2006; Wood, 2006) factors the level of indebtedness, liquidity in the short term and the size of the company have a strong and positively significant relationship with business performance.

For Yazdanfar et al. (2013), the study of the age of the organization in the market is important for the analysis of profitability, it indicates that the performance of the company changes systematically in the course of its permanence in the market, in this way, profitability is high in the first years of creation and as companies age and develop, their profitability decreases.

Other studies on microenterprises show a link between the administrative skills of their owners and their gender generate more sales but not profitability, while the participation of the owners in the business does not affect growth but adds profitability (Manzaneque et al.., 2016; Prijadi & Desiana, 2017; Valls- Martínez & Cruz-Rambaud, 2019).

This research work takes as a reference studies previously carried out on the profitability of companies, to understand the subject, in Table 1 several authors are cited, along with their methodology, and the results.

Table 1. Previous work on business performance

Author	Methodology	Results
Sánchez (1994)	It analyzes the large non-financial Spanish companies, whether they are listed on the Stock Market or not.	He verified how the circumstances in which each sector develops its operations justify undertaking different paths towards the search for economic profitability.
González Pérez et al. (2002)	Uses descriptive analysis to explain the behavior and distribution of the variables generated from accounting information	Factors that affect financial profitability and that could explain possible insolvency scenarios were identified.
Cortés, Rayo and Lara (2011)	Analyze data from companies that reported their financial statements in countries such as Spain and Portugal	The factors that explain financial profitability come from financial ratios of profitability, indebtedness, and management.
Arcos-Mora and Benavides-Franco (2008)	Study the stages of cash during the fiscal year and its influence on the performance of non-financial companies in Colombia.	The performance of non-financial companies in Colombia is not determined by the level of cash the company has during the fiscal year.
Cano-Flores, Olivera-Gómez and Balderrabano- Briones (2013)	Analyzes the structure of the Statement of Financial Position and Statement of Income. The economic value of the company is obtained through financial indicators.	Return on equity or return on assets are the indicators that are frequently used when evaluating financial success or bad debt.
Rivera-Godoy and Ruiz-Acero (2011)	Evaluate business performance through financial indexes.	Management and administration indicators largely explain the generation of financial returns.
Salazar-Mosquera (2017)	Evaluates the financial ratios of asset management and return on investment as determinants of financial profitability, through the correlation coefficient.	The turnover of goods sold is the main determinant of financial profitability.
Cedeño, Ostaiza and Vélez (2018)	Descriptive study with a qualitative approach of successful microenterprises. The participant observation technique and interviews with representatives of these various sectors were applied.	The microenterprises included in the present investigation achieved success in some aspects, while in others it is limited or they still do not achieve anything.
Sánchez and Lazo (2018)	It uses an exploratory factor analysis to determine the variables that affect business performance.	The size of the company is key when measuring business survival, microenterprises are more likely to avoid scenarios of financial distress

Author	Methodology	Results
Sumba-Bustamante and Santistevan- Villacreses (2018)	Use field research to describe the performance of a sample of 347 microentrepreneurs from three towns and cities in the Manabí province.	Use field research to describe the performance of a sample of 347 microentrepreneurs from three cantons in the Manabí province.

As could be seen, the studies, detailed in the table above, use a descriptive methodology, in some cases of a qualitative nature and in others of a cross-sectional quantitative nature based on univariate analysis of financial ratios, using information from companies obliged to keep accounting and accounting. That report their financial statements to the relevant regulatory entity.

In the other line of research mentioned, several authors have focused their attention on the determination of variables that explain the profitability of companies. In the same way, the objective, the methodology, and the results of some research studies are presented in Table 2.

Table 2. Explanatory studies of profitability

Author	Objective and methodology	Results
Yazdanfar et al. (2013)	Examines the profitability life cycle of Swedish microenterprises. The methodology used to explore the direction and strength of the relationship between all the variables in the ANOVA and MANOVA models was Pearson's relationship coefficient.	The profitability of the company changes systematically throughout the stages of its life cycle. Profitability is high in the first stage of their life cycle and as they develop and age, it decreases. The size variable influences profitability and the sector to which they belong has a more pronounced effect on companies than the size and life cycle stages variables.
Rasiah et al. (2014)	They empirically examine the trend of small, medium and large companies when their generated profitability is high. The methodology used to explain the behavior of profitability is through a regression model	Growth significantly explains the profitability of both small and medium-sized companies but was not significant in large companies.
Castillo-Valero y García-Cortijo (2013)	Identifies the explanatory variables that determine the profitability of the Castilla-La Mancha wine companies through an econometric model made up of performance variables, defined with the principal components technique.	The profitability of wine companies comes from: (a) their corporate structure, (b) their size, (c) financial structure
Ghosh y Guha (2015)	It determines the factors that affect the profitability of microenterprises in the slums of Mumbai through a generalized ordered logistic regression.	The age of the entrepreneur, the geographical location, the family structure of the entrepreneur, and the motivation to start the business are the main variables that determine the level of profitability of microenterprises.

Author	Objective and methodology	Results
Aulová et al. (2019)	It addresses the analysis of profitability indicators of agricultural companies in the Czech Republic through the DuPont analysis. The methodology used in this study is a correlation analysis	There are significant differences in the impact of both the economic profitability and financial profitability ratios between the individual groups of agricultural companies owned by legal entities.

From the results of the main explanatory works on business profitability, we gathered that both the financial indicators and the size variable have received special attention from researchers (Zambrano-Farías et al., 2018).

As a contribution to future research carried out in Ecuador, this work aims to initiate the study of financial profitability through comparisons of certain indicators that are important for the development of the company. Two groups of microenterprises have been considered: those that belong to the Guayas province and those that reside in the other provinces of the country. Therefore, the following hypotheses are proposed:

H1: On average, the financial profitability of micro-enterprises in the Guayas province is lower than the financial profitability of micro-enterprises in the provinces of the rest of Ecuador.

H2: The average level of indebtedness of microenterprises in the Guayas province is higher than that of microenterprises in the provinces of the rest of Ecuador.

H3: The short-term solvency of microenterprises in the province of Guayas is greater than that of microenterprises in the provinces of the rest of Ecuador.

2. Materials and method

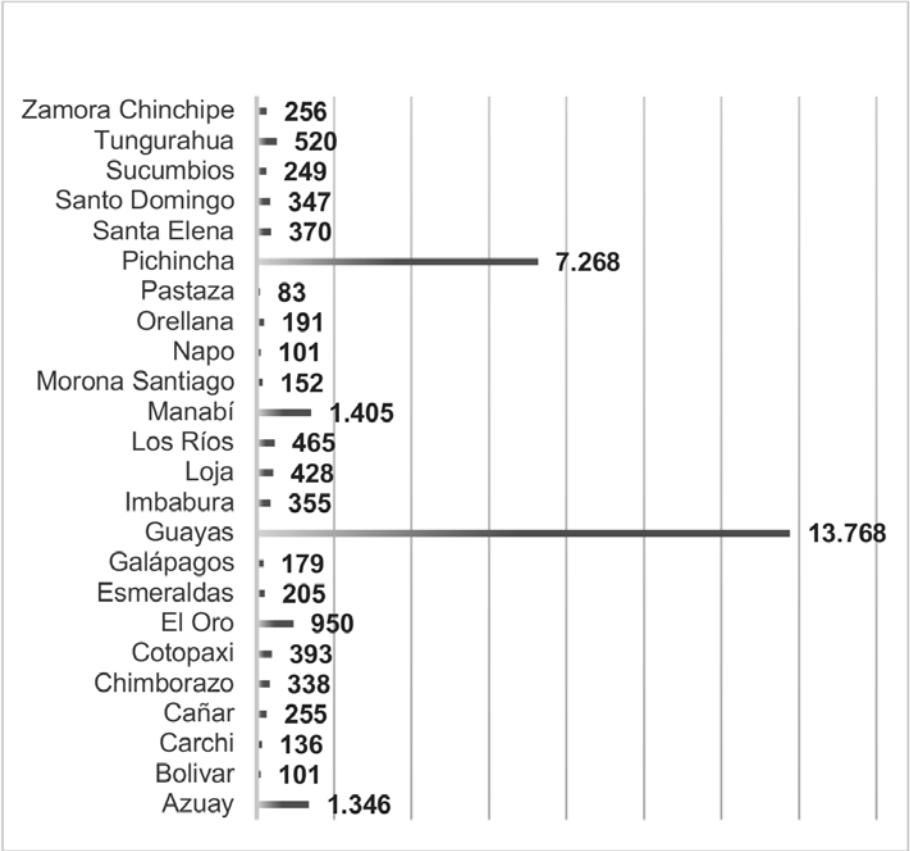
The methodology that supports this research is quantitative of a descriptive nature of cross-sectional design whose purpose is to analyze and compare the financial indicators of profitability, indebtedness, and liquidity of the microenterprises of the Guayas province with the microenterprises of the rest of the provinces of Ecuador.

Sample selection

For the selection of the microenterprises that make up the sample under study, the following process has been carried out: (i) As of 2019, the number of active companies that registered their operations in the Superintendency of Companies, Securities and Insurance (SCVS) was 67,660 at the national level, of which only microenterprises were taken into account for this study. Their selection was in accordance with the criterion: the amount of total income being less or equal to USD100 thousand dollars, (ii) companies whose equity is greater than USD800 dollars were chosen, and (iii) those whose status is reported as active to the SCVS.

A sample of 29,861 active companies nationwide was drawn. Figure 1 shows the distribution of microenterprises by province, it can be seen that the province of Guayas has the largest number of companies with 13,768, which represents 46.11 %. In the second place, is the province of Pichincha with 7,268 companies which represents 24.34 %, followed by Manabí with 1405 companies, and Azuay with 1346 companies which represent 4.71 % and 4.51 % respectively.

Figure 1. Distribution of micro-enterprises by province



Source: Superintendency of Companies, Securities and Insurance (2020).

An important aspect to highlight is the number of microenterprises according to their constitution. Table 3 details the types of companies both in the province of Guayas and in the rest of the provinces of Ecuador. In the province of Guayas, there are 12,766 public limited companies while in the rest of the country there are 10 125 companies of this type. It is important to note that there are 5,964 corporation-type companies on rustic properties in the rest of the provinces of Ecuador, while in the province of Guayas there are only three companies of this type. This is due to the fact that most microenterprises in the other provinces register their homes in non-urban areas.

Table 3. Microenterprises according to their constitution

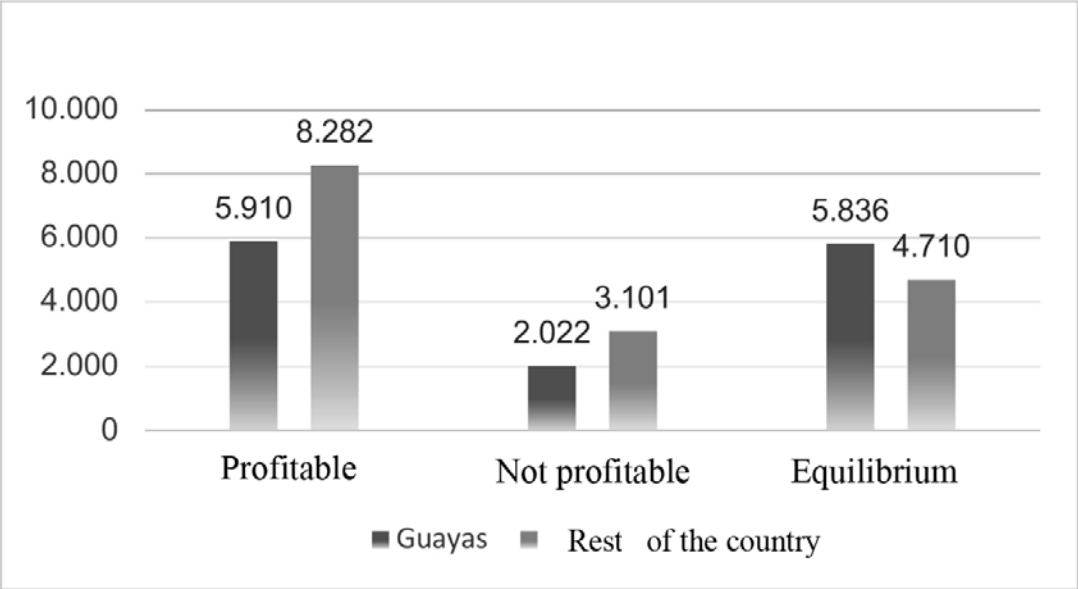
Company type	Guayas	Rest of the country
Limited company	12 766	10 125
Limited liability	994	1
Consortium	5	3
Limited company in rustic properties	3	5964
Total	13 768	16 093

Source: Superintendency of Companies, Securities and Insurance (2020).

Figure 2 shows the classification of microenterprises according to the results of their performance. Of the total sample of microenterprises in the Guayas province, 42.93 % of the companies are profitable, that is, 5,910 companies. The number of com-

panies with negative profitability (losses) is 2022 companies which represent 14.69 % of the sample, while companies that did not generate profit represent 42.39 %. In the rest of the Ecuadorian provinces, 51.46 % of the companies presented profits, 29.26 % presented losses and 19.26 % did not generate profit.

Figure 2. Microenterprises according to their results



Source: Superintendency of Companies, Securities and Insurance (2020).

Table 4 details the sector to which the microenterprises selected in the sample belong. In the province of Guayas, 61.83 % of the companies are concentrated in sectors A, G, L, and M, while in the provinces of Ecuador, 72.16 % of microenterprises are concentrated in sectors F, G, H, M and N.

Table 4. Distribution of microenterprises according to economic sector

Sector	Activity	Guayas	Rest of the country
A	Agriculture, forestry and fishing	1035	634
B	Mining and quarrying	67	207
C	Manufacturing industries	767	735
D	Electricity, gas, steam and air conditioning supplies	63	103
E	Water distribution; sewerage, waste management and sanitation activities	75	67
F	Construction	942	1610
G	Wholesale and retail trade; repair of vehicles, automobiles and motorcycles	3052	2246
H	Transport and storage	950	4,275
I	Accommodation and food service activities	200	226
J	Information and communication	522	832
K	Financial and insurance activities	394	389

Sector	Activity	Guayas	Rest of the country
L	Real estate activities	2549	618
M	Professional, scientific and technical activities	1877	2019
N	Administrative and support service activities	722	1,462
O	Public administration and defense; compulsory social security plans	3	1
P	Teaching	168	242
Q	Human health care and social assistance activities	207	235
R	Arts, entertainment and recreation	91	61
S	Other service activities	83	70
U	Activities of extraterritorial organizations and bodies	1	1
	Total	13 768	16 093

Source: Superintendency of Companies, Securities and Insurance (2020).

2.1. Variables

Profitability. In frequent investigations, the explained variable is the financial profitability that results from the quotient between the net profit margin and the equity. This ratio indicates the capacity of the shareholders' investment to generate profitability in the company.

Liquidity. Considered as a short-term solvency indicator. In general, it is a variable that directly affects the generation of profitability, it results from the quotient between current assets and current liabilities, it measures the ability of the company to pay its obligations (liabilities) in the short term.

Indebtedness. By means of this leverage ratio, the aim is to analyze the relative importance of financing through debt, showing what is the percentage of assets that microenterprises have financed through third parties.

2.2. Estimation method

For this study, a quantitative methodology was used. To test the hypotheses, the financial profitability, indebtedness, and liquidity were compared using a t-test for two independent samples with unequal variance. Specifically, the behavior of these financial ratios of microenterprises in the Guayas province has been compared with their counterparts in the rest of the country. The program used for this study was STATA.

3. Results

In order to observe the behavior of each of the financial ratios a descriptive analysis of the most representative univariate statistical measures was carried out for this research. Table 5 details the following information: On average, the financial profitability of the Guayas province is 15.60 % while the average financial profitability of the rest of the country is 29.60 %. It can be seen that for both groups the median value is zero, which indicates that half of the microenterprises in both the Guayas province and the rest of the country's provinces are negative. The asymmetry coefficient for both groups is negative, which indicates that the distribution of profitable companies is above the

average. Additionally, the distributions of both groups have a leptokurtic behavior, being higher in the Guayas province, which allows concluding that the profitability of microenterprises has a higher concentration around the average.

With regard to indebtedness, it can be seen that the province of Guayas has a higher average indebtedness, that is, 32.2 % finance their assets through debt, while the assets of microenterprises in the rest of the country's provinces 30.9 % have external financing. Fifty percent of the companies in the province of Guayas have their assets financed above 11.1 % through debt, while companies in the rest of the country's provinces have 13.0 %. The distribution of indebtedness, for both groups, has a positive bias, which indicates that the indebtedness of microenterprises is lower than the average, and given that their kurtosis coefficient is negative, it is concluded that both groups have a low concentration of data around the average.

Finally, the average current liquidity of microenterprises in the Guayas province is relatively higher than that of companies in the rest of the country's provinces, that is, for every dollar of debt. Despite this, 50 % of companies in the province of Guayas barely have USD 0.34 to pay off a dollar of debt in the short term, while microenterprises in the rest of the country have USD 1.11.

Table 5. Descriptive analysis of the variables

Statistical	Profitability		Indebtedness		Current liquidity	
	Guayas	Rest of the country	Guayas	Rest of the country	Guayas	Rest of the country
Mean	0.156	0.296	0.322	0.309	152.665	151.553
Median	0	0	0.111	0.130	0.342	1.11268
Kurtosis	2834.51	796.21	-1.203	-1.079	12699.49	5434.85
Asymmetry coefficient	-41.174	-14.190	0.668	0.704	110.72	70.05

As stated in the methodology, to test hypothesis 1 of this research, which indicates whether the average financial profitability of micro-enterprises in the Guayas province is greater than the financial profitability of microenterprises in the rest of the country, a test of comparison of means, whose results are shown in Table 6, was performed.

Table 6. Comparison of Guayas profitability versus the rest of Ecuador profitability

Variable	Observations	Mean	Interval of Confidence 95 %		T statistic	p-value
Profitability Guayas	13 768	0.156	0.054	0.258	-2.147	0.015
Profitability Rest of the country	16 093	0.296	0.218	0.375		

With a 95 % confidence level, it can be concluded that the financial profitability of the microenterprises in the Guayas province is not significantly higher than the financial profitability of the microenterprises in the rest of the country.

The results of the comparison of average indebtedness between the microenterprises of the Guayas province with respect to those of the rest of Ecuador are presented in Table 7.

Table 7. Comparison of Guayas indebtedness versus indebtedness in the rest of Ecuador

Variable	Observations	Mean	Interval of Confidence 95 %		T statistic	p-value
Indebtedness Guayas	13 768	0.156	0.054	0.258	-2.147	0.015
Indebtedness Rest of the Country	16 093	0.296	0.218	0.375		

With a 95 % confidence level, it can be concluded that the average indebtedness of the Guayas province is greater than the average indebtedness of the microenterprises of the provinces of the rest of Ecuador.

Regarding the short-term solvency of microenterprises, the results in Table 8. conclude that, on average, microenterprises in the Guayas province have greater liquidity than microenterprises in the rest of Ecuador.

Table 8. Comparison of Guayas liquidity versus rest of Ecuador liquidity

Variable	Observations	Mean	Interval of Confidence 95 %		T statistic	p-value
Liquidity Guayas	13 768	152.66	24.87	280.45	0.013	0.494
Liquidity Rest of the Country	16 093	151.55	56.80	246.30		

4. Conclusions and discussion

This research has explored the behavior of three financial indicators that are considered key for the analysis of the profitability of microenterprises. A comparative study has been carried out of the financial profitability, indebtedness, and current liquidity between the microenterprises of the Guayas province and the microenterprises of the rest of the provinces of Ecuador. Despite the fact that, as of 2019, the largest number of microenterprises are located in the Guayas province, it is not possible to conclude that they have better financial indicators than the microenterprises in the provinces of the rest of the country. The average profitability of microenterprises in the province of Guayas is lower than that of microenterprises in the provinces of the rest of Ecuador, but it must also be considered that there are more companies that develop in the mining and quarrying sector in the rest the provinces of Ecuador and that, on average, the amount of their assets exceeds USD 7 million, which could significantly benefit these companies.

The average indebtedness of microenterprises in the province of Guayas is two percentage points higher than companies in the rest of Ecuador, this indicates that there is homogeneity in terms of the criteria for financing at the national level. It is also

important to note that microenterprises in the Guayas province have a greater capacity to pay their obligations in the short term. Descriptive analysis indicates that 50 % of these companies have less than $ 0.34 to answer to their creditors in the short term. On the other hand, in the rest of the Ecuadorian provinces, 50 % of microenterprises have more capacity to pay in the short term.

The main contribution of the research is the delimitation of the data to the microenterprise segment since most of the studies focus on micro, small and medium-sized enterprises (defined as MSMEs) or small and medium-sized enterprises (defined as SMEs) as a single set, which makes it possible to highlight the importance of this type of organization in terms of its contribution to the Ecuadorian economy. Another contribution highlighted by this research aims to contribute to the development of lines of work that contribute to the development and design of policies that help the survival and business performance of microenterprises.

It is recommended to deepen this analysis for each province of the country, in such a way that the level of regional development can be determined and that it contributes to taking measures to promote equity between the regions.

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Tax burden and pressure. A study of the effect on the liquidity, profitability and investment of taxpayers in Ecuador

Carga y presión tributaria. Un estudio del efecto en la liquidez, rentabilidad e inversión de los contribuyentes en Ecuador

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Abstract

High rates and different taxes determine tax collection in different economic cycles in economies; in this context the research analyses the effect of tax burden and pressure on liquidity, Profitability and investment of taxpayers in the Province of Chimborazo, Ecuador in times of the Covid-19 pandemic and its relationship to the economic cycle. It contemplates the inductive method and a causal level - explanatory, data collection was through the questionnaire to a sample of 307 contributors of a total effective population of 39 503, where the Cronbach Alpha index is 89.9%. The selection of sample elements was in the framework of simple random probabilistic sampling considering as a database the contributors of the Internal Revenue Service; the data analysis was performed with the multinomial and linear logistic regression model. The results show that a high tax burden significantly affects taxpayers' liquidity, profitability and investment, and that changes in rates and rates lead to increases and reductions in income, profits and investments. It is concluded that the presence of an external factor such as COVID-19 significantly deepens the negative effect on the financial income and results of the company and on future investments. There is a direct relationship between the business cycle and tax revenue.

Resumen

Las altas tasas y diferentes impuestos determinan la recaudación tributaria en los diferentes ciclos económicos de las economías; en ese contexto, la investigación analiza el efecto de la carga y presión tributaria en la liquidez, rentabilidad e inversión de los contribuyentes en la provincia de Chimborazo, Ecuador durante la pandemia de Covid-19 y su relación con el ciclo económico. Contempla el método inductivo y un nivel causal-explicativo, la recolección de datos fue a través de un cuestionario a una muestra de 307 contribuyentes de una población total efectiva de 39 503, donde el índice de Alfa de Cronbach es de 89.9 %. La selección de elementos muestrales fue en el marco del muestreo probabilístico aleatorio simple considerando como base de datos los contribuyentes del Servicio de Rentas Internas; el análisis de datos se realizó con el modelo de regresión logística multinomial y lineal. Los resultados muestran que una alta carga impositiva afecta significativamente en la liquidez, rentabilidad e inversión de los contribuyentes, y que las modificaciones de las tasas y el tipo de impuestos producen incrementos y reducciones en los ingresos, utilidades e inversiones. Se concluye que la presencia de un factor externo como el Covid-19 profundiza significativamente el efecto negativo en los ingresos y resultados financieros de la empresa y en futuras inversiones. Existe una relación directa entre el ciclo económico y las recaudaciones tributarias.

Keywords | palabras clave

Taxation, tax burden, liquidity, taxes, profitability, investment, income, business cycles.
Tributación, carga tributaria, liquidez, impuestos, rentabilidad, inversión, ingresos, ciclos económicos.

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1. Introduction

In Latin America, the tax burden and pressure on taxpayers are high due to the different tax rates they bear with respect to their income, at the country level, this contributes to the development of economies, which are cyclical, based on phases such as expansion, boom, crisis, recession, and depression evidenced through products, investment and company profitability.

Tax collections are a source of financing for national income and these are related to the economic cycles of the economies. The contributions depend on the types of taxes. The higher the tax burden and pressure, the greater the national and State income; however, for taxpayers they can have positive or negative effects related to income, profitability, and business investment.

On the other hand, from the tax accounting perspective of taxpayers, there is a relationship between commercial and tax accounting, because accounting serves as the basis for tax determination and the deductions in the financial statements through "the identification, measurement, and synthesis of the facts and the economic reality of an entity" (Archel & Goméz, 2014, pp. 103-104). In this way, it can be deduced that general and tax accounting are not independent.

In this context, the tax situation in Ecuador was analyzed based on tax revenues to identify reasons for the increase or reduction of the tax burden and pressure on taxpayers and economic cycles and determine their effect on liquidity, profitability, and investment, considering the case of the province of Chimborazo.

Data from the Internal Revenue Service (2020) show that tax collection in 2020 reached around 11,313 million, a decrease from 2019, which was 14,268 million dollars, observing a reduction in 2019 and 2020 in relation to 2018. Tax revenues reach 20.6 % of GDP (2018) (OECD et al., 2020, p. 60). This drop in tax collection could be a consequence of the global Covid-19 pandemic that occurred as of March 2019, having an effect on the economic cycle of Ecuador (Table 1).

Table 1. Ecuador. Evolution of gross tax collection and pressure (2000 to 2019) (Expressed in millions of dollars)

Years	Tax collection	Tax revenue (per capita)	Tax revenue (SUS)	Tax pressure (% GDP)	Central Government fiscal pressure	Tax pressure Subnational governments	Contributions to Social Security
1999		147.00	1819.40				
2000	1675.00	184.00	2300.80				
2001	2380.00	279.00	3573.80				
2002	2759.00	320.00	4184.50				
2003	2975.00	284.00	3778.60				
2004	3349.00	287.00	3892.20		10.4	0.7	2.8
2005	4046.00	334.00	4579.80		10.9	0.7	2.7
2006	4686.00	387.00	5407.40		11.2	0.6	3.3
2007	5344.00	395.00	5617.40	15.66	11.7	0.6	3.5
2008	6409.00	432.00	6255.70	15.83	11.5	0.7	3.4
2009	6890.00	477.00	7027.00	16.56	12.4	0.8	3.3
2010	8070.00	559.00	8397.80	17.39	13.1	0.7	3.7

Years	Tax collection	Tax revenue (per capita)	Tax revenue (SUS)	Tax pressure (% GDP)	Central Government fiscal pressure	Tax pressure Subnational governments	Contributions to Social Security
2011	8894.00	658.00	10 042.90	18.66	12.5	0.7	5.0
2012	11 216.00	868.00	13 471.40	20.66	14.1	0.8	5.4
2013	12 638.00	887.00	13 999.50	20.54	14.6	0.8	4.8
2014	13 523.00	919.00	14 736.30	20.27	14.4	0.8	4.6
2015	14 341.00	1171.00	19 059.70	21.96	15.9	1.0	5.1
2016	13 388.00	1087.00	17 962.50	19.83	14.2	0.9	4.7
2017	13 680.00	1095.00	18 363.70	19.82	13.7	0.9	5.2
2018	15 145.00	1106.00	18 830.20	20.40	14.6	1.0	5.2
2019	14 268.00	1125.00	19 422.70	20.10	13.6	1.00	5.50
2020	13 313.00						
Promedio	8523.29	590.95	9214.70		13.92	0.86	4.54

Source: SRI (2020a), Landázuri (2019).

Likewise, considering that the tax burden:

> It not only obeys tax legislation. It is also influenced by non-tax regulations (labor, for example), tax administration, and taxpayer compliance, as well as the level, composition, and distribution of economic activity and income. (Rodríguez & Ávila, 2017, p. 119)

According to data in Table 1, the tax burden for 2018 was 20.40 % and in 2019 it was 20.1 % (latest data), observing an increase from 2007 of 4.4 % to 2019. On the other hand, the fiscal pressure borne by taxpayers from the Central Government in 2019 reached 13.6%, subnational governments 1 % and the contribution to social security 5.2 %, deducing that there is greater fiscal pressure on social security and taxes. Therefore, the increase in the tax burden can "significantly limit the possibilities of investment and the creation of companies with a sustainable trend in the long term" (Sarmiento, 2010, p. 202), as well as reduce income.

The taxpayers with the highest business participation are the microenterprise sector (latest data) with 90.81 %, small business 7.13 %, Medium-sized business "A" 0.95 %, Medium-sized business "B" 0.64 % and large business 0.47 %; where 42.66 % are service companies and 34.93 % trade, Agriculture, livestock, forestry, and fishing 10.38 %, Manufacturing Industries 8.38 %, Construction 3.43 %, Mining and Quarrying 0.22 % (Directory of Companies- DIEE, 2018, in INEC, 2020). On the other hand, on average, companies close between the third and fifth year of existence, which influences tax collection (Alcivar & Saines, 2011), that is:

> The chances of survival for microenterprises reach 52.7 % and for small enterprises 32.1 % and for medium enterprises A 25.8 %, Medium enterprises B 25%, and large enterprises 17.9 %, with the inverse relationship between size and the birth/death rate of the companies. (INE, 2017, p. 64).

The entry rate during 2010 to 2015 in the manufacturing sector was 20.66 % and exit 11.57 %, relatively lower than the rest of the sectors, but higher than 10 % (table 2).

Table 2. Business entries and exits (percentage) 2010-2015

Sector	Entry rate	Exit rate	Difference
Construction	38.65	24.91	13.74
Mines	37.07	18.13	18.94
Services	28.94	17.12	11.82
Commerce	24.16	11.64	12.52
Manufacture	20.66	11.57	9.09
Average	29.90	16.67	13.22

Source: INEC (2017, p. 70)

According to data from INEC (2020), total sales in 2018 (latest data available) in the commerce sector has the highest participation with 38.08 %, followed by services (24.40 %), manufacturing (21.43 %), mining, and quarries (6.85 %), agriculture, livestock, forestry, and fishing (5.75 %) and construction (3.49 %); sales being higher in large companies 71.97 %, small companies 11.29 %, medium-sized companies B 9.65 %, medium-sized companies A 6.15 % and micro-companies 0.93 %.

Therefore, it can be deduced that sales levels influence business liquidity. However, financial liquidity may be subject to tax burden and fiscal pressure; as the tax burden is high, a percentage of the liquidity could be used to pay taxes, which could affect profitability and investment.

Regarding profitability, authors such as Fernández (2004a) and Chen et al. (2010):

> How companies with higher profitability will have greater incentives to deploy strategies to reduce their tax burdens, showing a greater divergence between nominal and real rates. Finally, tax risk could also explain the behavior of companies in the tax order and be a moderator of more aggressive tax practices. (Monterrey & Sánchez, 2015 cited in Monterrey & Sánchez, 2020, p. 223)

With this background, the research sought to answer the question: How does a high tax burden affect the economic liquidity, profitability, and investment of taxpayers in Ecuador in times of pandemic-Covid-19, and what is the relationship with the economic cycle?

After a bibliographic review, different studies are observed in different countries, such as Belloso (2010) who analyzes the transaction tax; Sarmiento (2010) the tax burden; Pecho and Peragón (2013) and Quispe et al. (2019) evolution of tax reforms; Crespo (2016) the different ways to calculate the tax burden; Monterrey and Sánchez (2017) the relationship of the tax pressure on investment; Salto et al. (2018) the benefits of the taxes; Márquez et al. (2018) the effects of tax reforms on collection; Monterrey and Sánchez (2020) the evolution of the fiscal pressure; Rodríguez and Ávila (2017) distribution of the tax burden; Piedra et al. (2016) characterize taxpayers; Cardoso and Funchal (2011) evaluate the effect of labor and tax regulation; Llamas et al. (2019) measure the effect of income tax; Lima and Resende (2019) verify the taxes that contribute the most to the tax burden; Chávez and López (2019) analyze the factors that affect real estate collection; Brito-Gaona and Iglesias (2017) show about the increase in taxes and public spending.

It is important to highlight the research carried out by Sarmiento (2010, p. 204) who mentions "that a level of tax burden adversely affects the financial situation"; in this framework, Crespo (2016) and Quispe et al. (2017) show the different taxes that make up the tax burden in the case of Ecuador, and Monterrey and Sánchez (2017)

state that "future tax payments are an additional motivation to adopt an investment"; Márquez et al. (2018, p. 3) "show the incidence of the tax burden on taxpayers due to tax changes"; Ruiz-Vargas and Navarro-Morato (2016, p. 109) state that there is an effect on income tax when the rate is deducted; and Brito-Gaona and Iglesias (2017) show that tax pressure "has significant effects on private investment".

In this way, the research with the practical and theoretical background aimed to determine the effect of the tax burden on the liquidity, profitability, and investment of taxpayers in Ecuador during the Covid-19 pandemic and its relationship with the economic cycle, is relevant given that most of the studies were carried out before the pandemic and foreign investment is considered in almost exclusively and very little consideration is given to internal investment. For this reason, it was proposed as a general H1 hypothesis: high rates, types, changes, and Covid-19 significantly affect the income, profits, and investment of taxpayers and secondary taxpayers. High tax rates negatively influence taxpayers' income; H1b high rates and various types of taxes have a negative effect on taxpayers' liquidity, profitability, and investment because they reduce investment and profitability and affect liquidity; H1c changes in taxes and rates generate reductions or increases in income, profits and investment depending on the degree of significance of the type of tax; H1d the presence of an external factor such as Covid-19 significantly influences income, and H2 there is a direct relationship between the economic cycle and the tax collection cycle.

1.1. Theoretical aspects

The investigation understands that a taxpayer "is the natural or legal person to whom the law imposes the tax obligation for the verification of the generating event" (National Congress, 2018, Art. 25).

Executive Decree 1021 published under Official Registry No. 173 of March 31, 2020, reforms the Regulation for the Application of the Internal Tax Regime Law (LORTI) D.E. 374, R.O 209 of June 8, 2010, defines a monthly withholding on the total taxable income. The Organic Law for the Reactivation of the Economy, Strengthening of Dollarization and Modernization of Financial Management (2017) R.O.l No. 150 of December 29, 2017, mentions that there are two types of taxpayers:

> 1) Natural persons: a) obliged to keep accounting (income greater than $ 100,000 or working capital greater than $ 60,000 and annual costs and expenses greater than $ 80,000 (Art. 37) and b) taxpayers required to keep accounts of income and expenses (Art. 38). 2) Legal persons: companies. (National Assembly of Ecuador, 2018, Art. 98)

Regarding legal persons, the law obliges taxpayers to keep accounts and pay a set of taxes depending on the type of activity; for instance; Corporate Tax (22 %), Income Tax (25 %) of total taxable income and subject to a reduction of 10 % for reinvestment and 15 % for profit distribution); Tax on the currency leaving the country (5 %); Value added tax (12 %); Property tax; Municipal tax on total assets (0.12 %), among others. From this perspective, liquidity is "the ability of the company to generate resources that allows it to meet its short-term commitments" (Díaz, 2012, p.139).

In article 98 of the 2018 Tax Code of Ecuador, liquidity is "the degree to which a company can meet its current obligations, it is the measure of its short-term liquidity" and "that liquidity refers to the solvency of the overall financial position of the organization, which translates into the facility for the company to pay its debts" (Nava, 2009, p. 613).

Profitability "is the relationship that exists between profit and the investment necessary to achieve it" (Zamora 2008, p. 57), it is "a coefficient that measures the profit

generated by an investment" (Parada 1988, p.15). In this way, "Investment decisions are based on expected profitability" (Monterrey & Sánchez, 2020, p.198).

Roca et al. (2004, p. 33) mention that the impact or effects of the tax burden can be measured in four ways: "i) market equilibrium, ii) the profitability of formal and informal companies in the sector, iii) tax collection, and iv) the budget and well-being of the users". The impact on the profitability of the companies consists of "estimating the cost structure, through cash flows and the profit and loss statement" (Roca et al., 2004, p. 46), and the impact on Tax collection involves "considering the two models of both costing and tax incidence analysis" (Roca et al., 2004, p. 46).

With this background, the research considered measuring the impact through the effects of the tax burden on the liquidity, profitability, and investment of companies in a qualitative and quantitative manner, since the effect is a chain that begins in the tax reforms enacted by the different governments, where taxes and their rates are modified, which would bring as a consequence variation in income flows, profits, profitability, investments and prices, the labor force and, finally, in the economy.

2. Methodology

The inductive method was used and has a causal-explanatory level. A survey was conducted with 381 taxpayers, corresponding to the size of the sample, of which 307 were validated, the difference corresponds to questionnaires not completed in their entirety that are considered as lost cases; the 307 valid surveys were treated statistically. The selection of the subjects was random considering the SRI taxpayer database with cutoff to 2019 and a zonal stratification through urban parishes (Table 3).

Table 3. Population and sample

Type of taxpayer	Class of taxpayer	Total population	Sample size	Effective sample size	% effective sample	Strata
Special	Societies	374	4	5	2	Parroquia Lizarzaburo
	Natural person	46	0	0	0	Parroquia Veloz
Others	Societies	2023	20	1	0	Parroquia Maldonado
	Natural person	27 256	262	175	57	Parroquia Velasco
RISE	Natural person	9804	95	126	41	Parroquia Maldonado Centro
Total	Total	39 503	381	307	100	Total

Source: Own elaboration

Information was collected in different parish areas; the elaboration of the questionnaire responds to the operationalization of variables; the questionnaire considered Likert-type measurement scales of 5 points, it has a global Cronbach's Alpha index of 0.899 (89.9 %) that corresponds to an internal or content validation, considering that "the values are acceptable when they are equal to or greater than 0.70 and less than or equal to 0.90" (Campo-Arias & Oviedo, 2008, p. 837); and also correspond to an external evaluation through a pilot test carried out on 20 expert taxpayers and two tax

specialists, their analysis allowed improvements in the questions. The consistency of each section of the questionnaire is presented in Table 4.

Table 4. Consistency of the questionnaire by sections

Questions	Cronbach's alpha	Cronbach's alpha based on standardized elements	No. of elements
Characterization of taxpayers	0.834	0.781	12
Accounting elements	0.687	0.695	6
Tax Types	0.897	0.900	23
Income, expenses, savings and investment	0.806	0.816	8
Destination of savings	0.747	0.746	6
Motivation for tax compliance	0.829	0.829	7
Causes	0.872	0.872	11
Effects edit	0.883	0.883	11
Tax culture	0.823	0.823	13
Quantitative values on sales, expenses, profits, payment of taxes	0.609	0.843	13

Source: Own elaboration

For the analysis and demonstration of the hypotheses, we applied regression models considering that the effects are related to: wealth, income, and consumption. Regarding the types of rates, two are considered: public services and tax rates, where contributions can be direct or indirect, and finally, in relation to their incidence, companies should be considered from the point of view of their tax burden and tax pressure, giving rise not only to the economic effect but also to the legal aspect of taxes (Sarmiento, 2010).

Thus, the multinomial logistic regression model was used for qualitative data and linear regression for quantitative data.

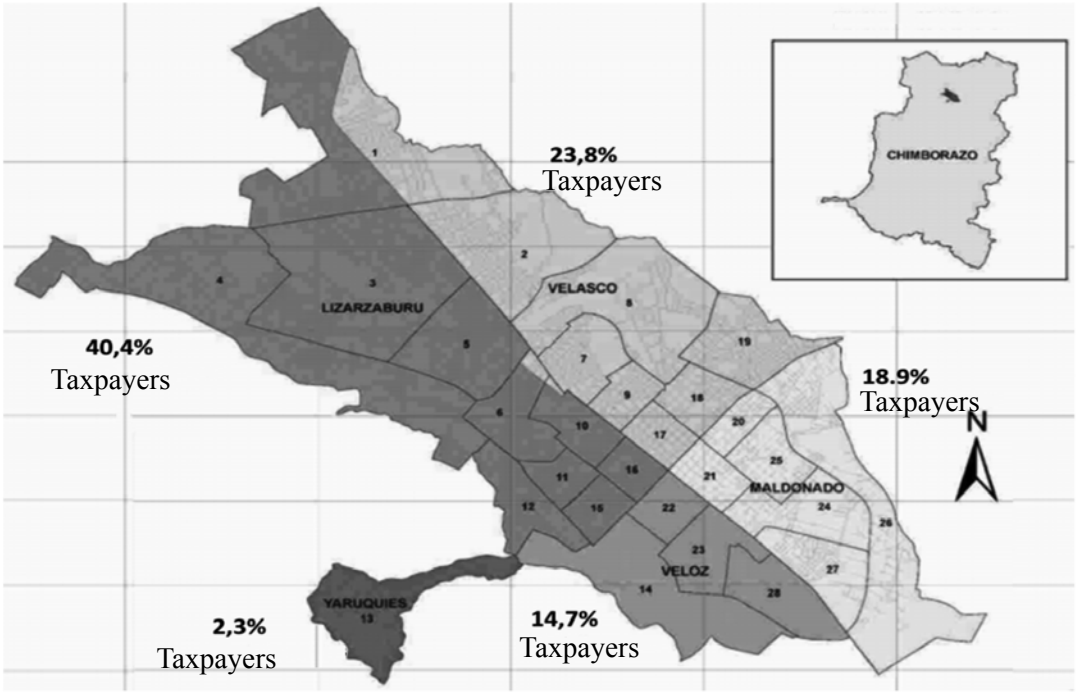
3. Results

3.1. Geographic characterization and concentration of taxpayers

The city of Riobamba in the Chimborazo province, Ecuador, has a population, according to the last population census of 2010 (INEC, 2020), of 234,170 inhabitants, which represents 49 % of the total population of the province of Chimborazo. According to a projection for 2020, there were 264,048 inhabitants, which would represent 50 %.

There are around 39,503 active taxpayers for 2020 (data that may change depending on the update of the SRI) located in the different parish areas of the city of Riobamba that carry out different economic activities at the local, provincial and national levels. They have their production, transformation, and commercialization plants located in five urban parishes: Maldonado parish, Lizarzaburo parish, Velasco parish, Veloz parish, and Yaruquies parish. The research reveals that there is a higher concentration of taxpayers in the Lizarzaburo parish at 40.4 %, followed by the Velasco parish with 23.8 %, Maldonado parish with 18.9 %, Veloz parish with 14.7 %, and Yaruquies parish with 2.3 % (figure 1).

Figure 1. Geographic concentration of taxpayers



Source: Own elaboration

3.2. Participation of taxpayers in economic activities

Commerce is the activity with the highest participation 46.9 %, followed by services 35.8 %, constructions 8.1 %; cooperatives 5.9 %, manufacturing industry 2 %; exploitation of mines and quarries 0.7 %; agriculture, livestock, forestry, and fishing 0.7 % (table 8).

3.3. Classification of taxpayers

The results show that the taxpayers classified by type of legal constitution are the following: 53.19 % are individual; 28.76 % society; 17.26 % family and 0.98 % other. Likewise, 41.04 % belong to the Simplified Tax Regime (RISE); 57 % General Regime (RG); 1.63 % Special and 0.33 % others. When performing a crossing of variables: 1) 54.6 % individual taxpayers belong to RISE, 44.8 % RG, 0.6 % special; 2) those of society, 14.6 % RISE, 85.2 % RG, 1.1 % special, and 3) family, 47.2 % belong to the RISE, 47.2 % RG and 5.7 % special. Deducing that RISE taxpayers are mostly individuals (70.6 %); in the General Regime (47.2 %) and Special Regime they are family (60 %).

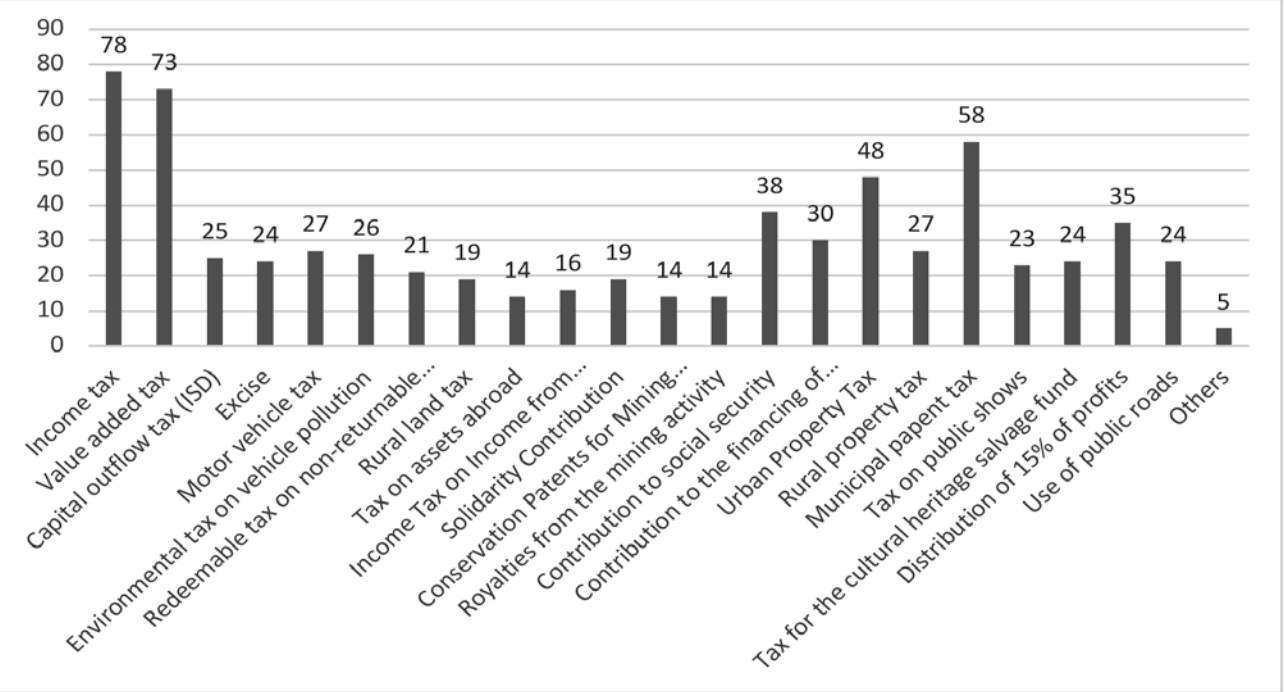
3.4. The components of the tax burden and their relationship to taxpayers' income

The tax burden allows:

> Estimate the relative weight of each item on total sales or income, then weigh, individually, by the corresponding tax rates that it affects, with which finally the net tax incidence is obtained as a percentage of total income. (Roca et al., 2004, p. 23)

The results show that the tax burden is made up of 23 types of taxes, the most significant being: Income Tax (78.2 %), Value Added Tax (73 %), Municipal Patent Tax (57.7 %), Tax to the Urban Property (47.9 %) (figure 2).

Figure 2. Tax burden of taxpayers (Expressed in percentage)



Source: Own elaboration

Likewise, the average monthly income of taxpayers reaches an average of $ 24,329 per month and $ 149,457.87 per year; in 2020 they were affected by the pandemic, causing the dissolution or liquidation of the companies. The data shows that around 0.7 % of the companies registered with the Superintendency of Companies were dissolved or liquidated (Superintendency of Companies, 2020). Consulting taxpayers, 47.7 % agree that tax rates are high, 45.6 % agree that there exist various types of taxes, and 44 % agree that they affect their income (table 5).

Table 5. Variables related to taxes and taxpayers' income (percentage)

Variables	Strongly disagree	Disagree	Indifferent	Agree	Strongly agree	Total
V1. High tax rates	4.20 %	10.10 %	22.10 %	47.60 %	16.00 %	100.00 %
V2. Various types of taxes to pay	2.00 %	10.10 %	27.60 %	45.60 %	14.70 %	100.00 %
V3. Affects the company's income	5.20 %	7.50 %	26.10 %	44.00 %	17.30 %	100.00 %
Model 1 a. Dependent variable: Affects the income of the company b. Predictors: V1 high tax rates	R squared 0.339	Adjustment Sig. 0.000	Deviation 0.000	Contribution to the explanation Agree 73.30 % Beta 2.836 Sig. 0.000	Contribution to the explanation strongly agree 58.50 %	Contribution to the indifferent explanation 40.00 % Beta 2.923 Sig. 0.000

Source: own elaboration

The polynomial logistic regression model applied to the categorical variables; the results allow to show that H1a high tax rates (fiscal pressure) significantly affects the income of taxpayers in 33.9 % (Dependency Sig. 0.000) deepening in 2020 as a consequence of restrictions due to the Covid-19 pandemic. In addition, an increase in tax rates would represent a reduction of 0.257 in income, and an increase in the total number of taxes would affect a reduction of income by 0.542, therefore the tax burden negatively affects taxpayers.

3.5. Qualitative measurement of the effect of the tax burden and pressure on liquidity, profitability, and investment

The application of the multinomial logistic regression model to independent variables: high rates and types of taxes; Dependent variables: income Model 1, profit Model 2, investment Model 3. The results of Model 1 show that high tax rates affect income by 33.9 % (R2 = 0.339 Sig. 0.000). In Model 2, it affects the reduction of profits by 30.2 % (R2 = 0.302 Sig. 0.001) with a ratio of 55 % (R = 0.550). In Model 3 it affects the reduction of investment by 28.9 % (R2 = 0.289 Sig. 000) with a ratio of 44.1 % (R = 0.441) (table 6). This means that H1b high tax rates and various types of taxes have a negative effect on the liquidity, profitability, and investment of taxpayers is true, because they reduce investment and profitability and affect liquidity. In addition, the taxpayer has the obligation to pay a set of taxes and not receive tax incentives that improve profitability. As mentioned by Hall and Dale (1967), tax incentives in investment are effective because a deduction of investment tax rates can stimulate an increase in investment in assets. Therefore, the increase in the tax burden on taxpayers discourages investment, affects liquidity and profitability and the dynamics of business development, exacerbating the economic crisis in a country affected by the Covid-19 pandemic.

Table 6. Results of the regression model

Model	R squared	Sig.	Pearson	High rates Indifferent	Type of taxes Agree
Model 1. (Y1) Affects income	0.339	0.000	0.000	Beta 2.836 Sig. 0.000	Beta 2.923 Sig. 0.000
Model 2. (Y2) Reduction in profits	0.302	0.000[b]	0.550	Beta 2.808 Sig. 0.001	Beta 1.800 Sig. 0.001
Model 3. (Y3) Reduction in investment	0.289	0.000	0.441	Beta 3.670 Sig. 0.000	Beta 1.574 Sig. 0.000

Source: Own elaboration

3.6. Quantitative measurement of the tax burden

The application of linear regression to the quantitative data of the variables shows that the tax burden significantly affects income in 93.1 % (R^2 = 0.931, R = 0.965, Sig. 0.000); financial liquidity 92.6 % (R^2 = 0.926, R = 0.962, Sig. 0.000); and profitability in 91.2 % (R^2 = 0.912, R = 0.955, Sig. 0.000); and not investment (0%) (table 7).

Table 7. Quantitative measurement of the impact of the tax burden

Summary				
Model	**R**	**R squared**	**Adjusted R squared**	**Sig.**
Income	0.965[a]	0.93	0.93	0.000[b]
Liquidity	0.962[a]	0.93	0.93	0.000[b]
Cost effectiveness	0.955[a]	0.91	0.91	0.000[b]
Investment	0.001[a]	0.00	0.00	0.000[b]
a. Predictors: (Constant), How much is the company's tax payment? Annual (dollars)				

Source: Own elaboration

It means that a high tax burden has a significant negative effect on taxpayers' liquidity and profitability, but it does not have a negative effect on investment, and this becomes more acute when there is a pandemic, H1b being true.

3.7. Effects of taxes and tax rates

It is identified that H1c changes in taxes and tax rates generate reductions or increases in income, profits, and investment depending on the degree of significance of the type of tax (table 8), where: an increase in income tax can reduce investment by 19.8 %, profits by 1.7 %; however, it would not have an effect on income, since it is not a significant determinant (Sig. 0.823). On the other hand, the reduction of the Value Added Tax would increase investment (15.9 %), profits (4.8 %), and income (3.7 %) although the profit and income do not depend on VAT. The solidarity contributions would have a significant effect on the reduction of the investment (25.0%) and profits (19.4), such as the contributions destined for the comprehensive financing of cancer treatment, it would reduce the profits by 15.5 % and the Tax for the heritage salvage fund would affect in revenue by 14.6 %. Also, it is observed that an increase in conservation patents for the mining concession would significantly increase income by 15.4 %, in the same way, the Tax on patents would increase profits (14.9 %) and income (12.9 %), and the payment for the occupation of public roads would increase by 13.7 %. Finally, an increase in tax rates would reduce investment by 14.2 %, profits by 18.9 %, and affect income by 47.8 %. Also, it is observed that an increase in conservation patents for the mining concession would significantly increase income by 15.4 %, in the same way, the Tax on patents would increase profits (14.9 %) and income (12.9 %), and the payment for the occupation of public roads would increase by 13.7 %. Finally, an increase in tax rates would reduce investment by 14.2 %, profits by 18.9 %, and affect income by 47.8 %.

Table 8. Coefficients of the regression models

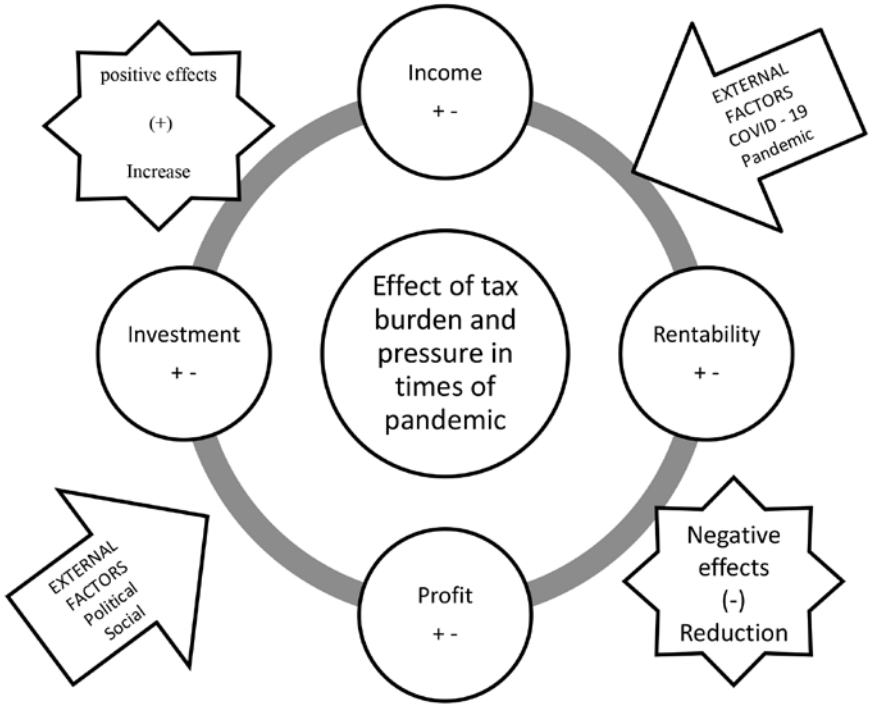
	Non-standardized coefficients	Standardized coefficients	t	Sig.	Non-standardized coefficients	Standardized coefficients	t	Sig.	Non-standardized coefficients	Standardized coefficientss	t	Sig.
	B	Beta			B	Beta			B	Beta		
	Reduce investment				Reduce profits				Affects income			
(Constant)	2,864		5,831	,000	2,682		6,018	,000	2,352		6,006	,000
Income tax	,198	,169	2,539	,012	,017	,016	,241	,809	-,014	-,013	-,224	,823
Value added tax	-,159	-,144	-2,234	,026	-,048	-,047	-,743	,458	-,037	-,036	-,649	,517
Capital outflow tax (ISD)	,111	,091	1,214	,226	,248	,220	2,984	,003	-,078	-,069	-1,070	,286
Excise	-,020	-,017	-,219	,827	-,157	-,145	-1,861	,064	-,024	-,022	-,324	,746
Motor vehicle tax	-,008	-,007	-,082	,935	-,057	-,057	-,671	,503	,056	,055	,740	,460
Environmental tax on vehicle pollution	-,074	-,068	-,835	,405	,011	,011	,137	,891	,108	,109	1,543	,124
Redeemable tax on non-returnable plastic bottles	,036	,030	,368	,713	-,031	-,028	-,346	,730	,190	,170	2,439	,015
Rural land tax	,085	,070	,817	,414	-,018	-,016	-,192	,847	-,099	-,088	-1,197	,232
Tax on assets abroad	-,159	-,106	-1,213	,226	-,064	-,047	-,542	,589	,184	,133	1,765	,079
Income Tax on Income from Inheritances, Bequests, and Donations	-,088	-,062	-,819	,414	-,051	-,039	-,522	,602	-,137	-,105	-1,597	,111
Solidarity Contribution	,257	,218	2,674	,008	,194	,178	2,220	,027	,012	,011	,157	,875
Conservation Patents for Mining Concession	-,061	-,040	-,527	,599	-,044	-,032	-,421	,674	-,217	-,154	-2,345	,020
Royalties from the mining activity	-,018	-,012	-,147	,884	-,033	-,025	-,307	,759	-,033	-,025	-,344	,731
Contribution to social security	-,102	-,100	-1,234	,218	,017	,018	,229	,819	,108	,115	1,649	,100
Contribution to the financing of comprehensive cancer care	,114	,115	1,561	,120	,142	,155	2,140	,033	,093	,101	1,586	,114
Urban Property Tax	,004	,004	,051	,960	,005	,005	,072	,942	-,049	-,053	-,846	,398
Rural property tax	-,037	-,030	-,423	,673	-,117	-,103	-1,490	,137	-,046	-,040	-,666	,506
Municipal papent tax	-,012	-,012	-,185	,853	-,136	-,149	-2,250	,025	-,119	-,129	-2,231	,026
Tax on public shows	,044	,032	,413	,680	,083	,066	,856	,393	-,027	-,022	-,323	,747
Tax for the cultural heritage salvage fund	,029	,026	,313	,755	,088	,087	1,065	,288	,148	,146	2,041	,042
Distribution of 15% of profits	-,004	-,004	-,049	,961	-,036	-,038	-,441	,659	-,019	-,020	-,264	,792
Use of public roads	-,127	-,110	-1,549	,122	-,017	-,016	-,231	,817	-,145	-,137	-2,231	,026
High tax rates	,142	,129	2,216	,027	,189	,187	3,252	,001	,478	,471	9,378	,000

Source: Own elaboration

3.8. Effects of the tax burden and pressure due to the restrictions of the Covid-19 pandemic

Data shows that 2020 taxpayer income was medium 62.9 %, low 26.7 %, and high 10.4 %. The application of linear regression shows that the average levels of income influence (Sig. = 0.006) the amount of taxes to be paid by 2 % (R^2 = 0.024), also, the changes that income may undergo due to the Covid-19 pandemic would significantly increase (sig. 0.006) the payment of taxes by 15.6 %. Therefore, H1d the presence of an external factor such as Covid-19 significantly influences income (figure 3).

Figure 3. Effect of tax burden and pressure



Source: Own elaboration

4. Discussion and conclusions

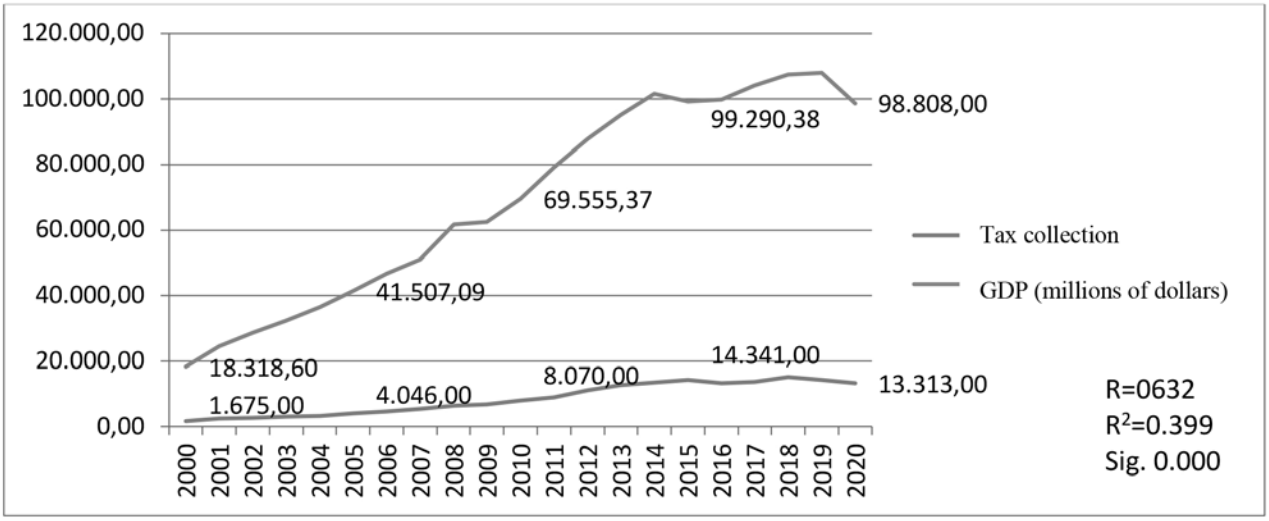
The results allow corroborating that "there is empirical evidence that shows the negative effect that taxes have on the economy" Serrano (2009, p.133) and there are "significant negative effects of taxes on economic activity" Blanchard and Perotti (2002, p. 1329); on the other hand, variations in tax rates can have a "positive influence on foreign direct investment" (Klemm & Van, 2010, p. 5), however the same does not happen with domestic investments.

In this context, it is evident that the tax burden and pressure has a negative effect on income, profitability, and investment. On the other hand, if these were reduced, they would contribute to the improvement not only of income and profits but mainly it could become a motivating element for investment, as Cardoso and Funchal (2011, p. 152) mention, the "effect of the tax regulation on investments, the results show that there is statistical significance and that a reduction in the tax burden, measured by taxation on business profits, can raise investment levels".

On the other hand, the presence of significant effects on the investment of taxpayers shows that "tax pressure has significant effects on private investment". Brito-Gaona and Iglesias (2017, p.153) and Caballero and López (2012) concluded that the "Income Tax and the Value Added Tax seem to have a direct and not an inverse relationship with private investment" (p. 54); However, it is true that "Income Taxes have a perverse effect on private investment decisions, therefore, on economic growth and employment" (Caballero & López, 2012, p. 62), as was also found in the present investigation.

Finally, in H2 there is a direct relationship between tax collection and the economic cycle because both the pressure and the tax burden fall on collection. There is a direct relationship between tax collection and GDP in 63.2 % and explains 39.9 % (R = 0.632, R2 = 0.399), with a dependency (Sig. 0.000); that is, if there is an increase in GDP, there is also an increase in collection or vice versa, although it may be proclive, as is also the case in other countries (figure 4). However, there are problems for collection due to factors such as "the economic structure and level of development, political institutions, cultural and ideological aspects and the relationship between the State and society" (Gómez, 2009, p. 36). State intervention is important to generate tax policies that regulate the tax burden and pressure which improves the economy through the creation of a "tax culture based on management control, information integration and social equity" (Mejía et al., 2019, p. 1152).

Figure 4. Economic cycle GDP and tax collection (2000-2020)



Source: Own elaborationINEC, 2021.

Therefore, it is shown that it is true that tax burden and pressure has a negative impact on liquidity, profitability, and investment because a variation in the rates and in the number of taxes significantly influences those aspects, since a high tax burden not only reduces liquidity and profitability but also investment, affecting the economic cycle. This means that the impact of the tax burden is not only related to the impact on the distribution of real income from taxes (Pablo et al., 2006) but also to the impact on the subject (taxpayer) who "really supports the burden of the tax causing his/her profitability to be diminished by the tax effect" (Sarmiento, 2010, p. 208) since it presupposes a reduction in liquidity, since most cash is directed towards the payment of taxes. In this way, the research shows that the collection and business performance depend on the variations in the tax burden and pressure that taxpayers have, and has a direct relationship with the economic cycle, because the increase in tax obligations can affect the

profits and investment in a positive or negative manner as well as the economy since one of the factors of economic growth is related to business development and this can only happen if there is business success. This will depend on factors such as:

> Organizational culture, the way in which they reacted to the conditions of the environment, the availability of resources, the decisions they make, the reduction of risk, and the use of the business opportunities they have. (Tapia-Alba & Chiatchooua, 2021, p. 9)

The research shows that the pressure and tax burden have a negative effect, however, tax incentives can have a positive effect:

> Since by not paying taxes, liquidity increases, thus having more resources to meet commitments. On the other hand, solvency is improved, since it reduces in a significant amount the liabilities for Income Tax. (Yaguache et al., 2019, p. 377)

This affects the income of the economy. Therefore, the economic cycle also depends on collections, which has a significant positive and negative effect on the business activity and performance of taxpayers and not only on tax collection, but at the same time affects the economic cycle of a country, since it was determined that there is a direct relationship.

Therefore, we conclude that:

The type and number of taxes that people are obliged to pay as a RISE, RG, or special taxpayer has an effect on the decrease of investment, profit, and income.

Variations in Income Tax, Solidarity Contribution, and the increase in tax rates significantly decrease investment, while the Value Added Tax stimulates investments.

There would be a reduction in profits due to changes in the Tax on the Outflow of capital, Solidarity Contributions, Contribution to the financing of cancer treatment, and an increase in tax rates; however, the Patent Tax would increase profits.

There is a negative effect on taxpayers' income as a consequence of the changes in the Tax for the Fund for the Salvage of Cultural Heritage, occupation of public roads, high tax rates. On the other hand, it is positive when there is an increase in Conservation Patents for Mining Concession, Tax on municipal patents, Tax for the cultural heritage salvage fund and Occupation of public roads.

It is evident that tax pressure has a significant effect on taxpayers' investment and there is a direct relationship between tax collection and the economic cycle in Ecuador.

The limitations of this research are related to access to updated and disaggregated data, because the limited access to accounting information of taxpayers who are not obliged to keep accounting, has meant that this segment is not considered in the research, which represents the need to deepen and broaden the study to this segment and to other regions of Ecuador in order to compare the results and reach a generalized conclusion.

One of the possible lines of research created by this study is the approach and deepening of the taxpayer's behavior in the context of taxation at the national level.

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Challenges of Ecuadorian entrepreneurship, transcending to post-pandemic times

Retos y desafíos del emprendimiento ecuatoriano, trascendiendo a la pospandemia

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Abstract

The systemic and unexpected changes, derived from COVID-19, abruptly pushed Ecuadorian enterprises to disassociate themselves from the traditional on-site business model. In this sense, they were forced to incorporate innovation and communication technologies, with little preparation and knowledge, moving towards a remote business model and inserting themselves into the digital economy, to respond to the new post-COVID-19 reality. This led to analyze the Ecuadorian entrepreneurship in the pandemic as well as the challenges to be faced in the post-pandemic period, through a documentary review on the incidence of the crisis context in its evolution, the findings, and obstacles to be faced in Latin America; as well as the actions used by entrepreneurs and the government to face the pandemic, being essential to also address the rise of digitalization and the challenges to be faced. The results show that Ecuadorian entrepreneurship is in a process of internal adjustments due to its own needs and influenced by the environment by the health crisis, public policies, and the new regulatory framework. It is concluded that the country requires a profound change in entrepreneurship, where the digitalization of processes and digital literacy are the basis for economic resurgence; however, this implies challenges and joint efforts of all economic and governmental agents over time, to demonstrate a prosperous evolution that contributes to the stability of enterprises, and therefore, of the national economy.

Resumen

Los cambios sistémicos e inesperados derivados del Covid-19 impulsaron de manera abrupta a los emprendimientos ecuatorianos a deslastrarse del modelo tradicional del negocio in situ. En ese sentido, se vieron forzados a incorporar las tecnologías de innovación y comunicación, con poca preparación y conocimiento, pasando hacia un modelo de negocio a distancia, para responder a la nueva realidad poscovid-19. Esto motivó a analizar el emprendimiento ecuatoriano en pandemia, así como los retos y desafíos a enfrentar en la pospandemia, mediante una revisión documental sobre la incidencia del contexto de crisis en su devenir, los hallazgos y obstáculos a enfrentar en el ámbito latinoamericano; así como las acciones empleadas por los emprendedores y el gobierno para afrontar la pandemia, siendo neurálgico abordar también el auge de la digitalización y los desafíos a enfrentar. Los resultados muestran que el emprendimiento ecuatoriano se encuentra en un proceso de ajustes internos por necesidades propias e influidos desde el entorno por la crisis sanitaria, las políticas públicas y el nuevo marco regulatorio. Se concluye que el país requiere un viraje profundo de los emprendimientos, donde la digitalización de los procesos y la alfabetización digital son las bases para el resurgimiento económico; sin embargo, esto implica desafíos y esfuerzos mancomunados de todos los agentes económicos y gubernamentales, para evidenciar una evolución próspera que coadyuve a la estabilidad de los emprendimientos y de la economía nacional.

Keywords | palabras clave

Covid-19, entrepreneurship, information technologies, digital media, internet, public policies, flexibility, market.

Covid-19, emprendimiento, tecnologías de la información, medios digitales, internet, políticas públicas, flexibilidad, mercado.

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1. Introduction

The rapid spread of Covid-19 generated an unprecedented health crisis that is undoubtedly systemic. According to Das and Wingender (2021, para. 2) "compared to previous international crises, the contraction has been sudden and deep; according to quarterly data, the reduction in world output was approximately three times more than during the global financial crisis, and in half the time". In this sense, the International Monetary Fund (2020) specifies that, as of October 2020, although there was a reactivation of the economy, the spread of the pandemic to other areas slowed the reopening of countries and their economies. In quantitative terms, the global reduction in working hours, compared to 2019, equates to the loss of 400 million full-time jobs. For this reason, the World Trade Organization (2021, s/p) points out, that "the Covid-19 pandemic represents an unprecedented disturbance of the world economy and trade".

In Latin America, the impact has been significantly negative, with Ecuador being one of the most affected countries, ranking seventh in June 2020 in confirmed cases of coronavirus in Latin America and the Caribbean (Statista, 2021). Therefore, it is impossible in 2021 to dissociate oneself from the virus in Ecuador, since there are still high levels of infections in the population despite the start of the vaccination process, which affects the future of enterprises in the country. The national economy continues to suffer the paralysis (70 %) of the productive apparatus in 2020 and the separation of 60,000 workers from their jobs (Heredia-Zurita & Dini, 2021). Navarro-Cejas et al. (2021) add that it is an ongoing process that begun in 2019 and the level of impact it produced on the world's economies remains to be seen.

From this perspective, the outlook seems disadvantageous and even not conducive to entrepreneurship. However, the study in 43 economies carried out by the Global Entrepreneurship Monitor (2021), revealed that in nine of them more than half of those who start or run a new business agree that the pandemic created new opportunities that they could take advantage of. In addition, they observed that a higher proportion of entrepreneurs located in Europe, North America, Latin America and the Caribbean, showed motivation to start a business that made a difference.

In this understanding, Kraus et al. (2018) and Nambisan (2017) point out the opportunities offered by technologies to entrepreneurs. While Coco (2020), focuses on such opportunities in three sectors, within the current crisis: Edtech, Fintech and Ehealth. The first, referring to education, which has become an increasingly broad portion, which according to Williamson (2021, p. 1) includes:

> A great variety of actors (human and non-human), organizations (public, private or multisectoral), material and technical forms (hardware, software, supporting documents), modes of practice (of teachers, designers, promoters), and framed discourses, besides being a field of research (…).

The second (Fintech) concerns the development of financial sector organizations previously resistant to new business models. According to Goldstein et al. (2019, p. 1647) it is about "(…) the fusion of finance and technology, (…) start-ups with new technology are competing to fill the gaps in the customer experience left by traditional companies".

In the Ehealth or health sector, technology is observed in automation, telemedicine, mobile applications, artificial intelligence, wearables, gamification, virtual and augmented reality (Campus-Sanofi, 2020), among others. And despite the advances, the World Health Organization (2019, p. V) points out that, "At the end of the day, these technologies are not an end in themselves, but essential tools to promote health, preserve safety global and serve vulnerable populations".

In these sectors, entrepreneurs leveraged on technology have innovated and managed to take advantage of the advantages they offer to face the consequences of the global crisis generated by Covid-19, giving dynamism to the battered economy. In the case of Ecuadorian entrepreneurship, although the main actions were aimed at financial and tax obligations, minimizing employment, and increasing access to credit, the need for income led to an incipient and poorly prepared use of information and communication technologies, in order to offer goods and services, maintain contact with customers and attract potential consumers, demonstrating their preponderant role in facilitating and maintaining economic activities.

These approaches show a reality that still does not offer concrete data and information. In the words of Acosta (2020, p. 369), "it has gone from using exclusively highly credible information to accepting reasonably credible information (…)", which motivates conducting an investigation that offers contributions and certain insights to entrepreneurs of the region, but in particular Ecuadorians: it is urgent to show the state of the art of entrepreneurship (Brown & Rocha, 2020; Nassif et al., 2020). Therefore, the study analyzes Ecuadorian entrepreneurship in a pandemic, as well as the challenges to face in the post-pandemic, for this, a documentary review was carried out on the incidence of the crisis context in its evolution, the findings, and obstacles to face, as well as the actions used by entrepreneurs and the government to face the pandemic, it is also essential to address the rise of digitization and other trends that seem irreversible and constitute challenges for the immediate future.

2. Corpus selection criteria

The analysis carried out was based on the consultation and systematic review of both physical and digital texts and documents, found in the electronic platforms of indexed scientific journals and digital repositories of Dialnet, Redalyc, ResearchGate, Google Scholar, Scopus, and Scielo. The systematization of the theoretical and documentary review had two phases:

In the first, a general search was carried out, obtaining 104,566 documents on Latin American entrepreneurship, leading to a second phase, where spatial and temporal criteria were established, as well as descriptors, namely: Latin America, digital entrepreneurship, Covid-19, in a pandemic, challenges, Ecuador; with these specifications the number was reduced to 1,380 documents. Now, when filtering the information again, taking the 2020-2021 period as a time criterion and maintaining the aforementioned descriptors, 68 documents were selected, distributed as follows: 26 scientific articles, 24 documents from national and international institutional entities, and 18 various documents (texts, thesis, internet documents, and digital news) that allowed addressing the subject and complementing the study.

Subsequently, the collected texts and documents were organized, using an analysis matrix, consisting on its horizontal axis by year of publication, author(s), title, language, summary, criteria, contributions, and type (text or document). This decomposition allowed the detection of central elements, as well as similarities and disparities regarding entrepreneurship in Ecuador. Then a document was prepared with the results, extracting the most relevant information, which is presented below. The document allows an understanding of the attainment of events in the category under study as the pandemic progresses, inducing enterprises to take measures and generate digital strategies in accordance with the new reality that requires entrepreneurs to insert themselves into the digital economy in order to compete in the post-pandemic world.

3. Debate and contributions to the state of the art

3.1. Overview of entrepreneurship in a pandemic: Latin America and Ecuador

Latin America and the Caribbean have not been immune to Covid-19; the business system has been affected, generating weaknesses (decreased income, little access to public financing, lack of investment capacity) and consolidating the structural heterogeneity of the region. In this regard, the Colombian Confederation of Chambers of Commerce (2020) stated that 96 % of companies had a collapse in their sales and 82 % of formal companies could continue their activities between one and two months with their own resources. Similarly, according to the National Confederation of Industry (2020) in Brazil, 76 % of companies decreased and/or stopped their production and 55 % have had difficulties accessing credit to increase working capital.

In Argentina, 44% of the companies stated that they did not have enough liquidity to meet 50 % of the labor wage commitments in April 2020; 38 % could not pay for public services; 48 % could not pay suppliers, and 57 % did not pay taxes (Unión Industrial Argentina, 2020). The situation was not better in Chile, since the National Chamber of Commerce, Services and Tourism of Chile (2020) indicates that 37.5 % of companies reduced their staff (April and May), and 44 % of them are in a bad or critical financial situation. In this context, the Economic Commission for Latin America and the Caribbean (ECLAC) (2020, p. 6) points out that:

> (…) The impact will be much greater in the case of micro-enterprises and SMEs, due to their weight in the business structure of the region, which will translate into business closings and job losses (…) and it is estimated that more than 2.7 million formal companies would close in the region, with a loss of 8.5 million jobs.

It is irrefutable that Covid-19 has generated negative impacts, from which the entrepreneurs did not escape, because according to Kantis and Angelelli, (2020, p. 4) "53 % of those who already sold, stopped doing it, 8 out of 10 are being strongly affected by the crisis. Likewise, 84 % have seen their cash flow very deteriorated and 75% reduced their productive activity". To be more precise, "Venezuela, Argentina, Brazil, and Mexico registered setbacks in their conditions for entrepreneurship" (Kanti et al., 2020, p. 11). Along with this situation, they have had to face a series of problems that are identified in Figure 1:

Figure 1. Obstacles for entrepreneurship in Latin America

Source: Kantis and Angelelli (2020, p. 10).

The shared findings show that the weaknesses of the enterprises have been amplified and accentuate the direct and indirect economic, social and environmental tensions; also generating impacts on the entrepreneur and his/her determinants. Thus, the reduction in the space of opportunities led to a decrease in entrepreneurial intention and this led to "7 of the 15 Latin American countries registering a drop in their values of the Systemic Conditions Index for Dynamic Entrepreneurship, among them: Venezuela, followed by Argentina, Brazil, Mexico and Peru" (Kanti et al., 2020, p. 40).

Despite the adverse situations and conditions present in the region, digital ventures have managed to maintain projects and promote innovations. According to García-Madurga et al. (2021), among the changes that are envisioned, information and communication technologies predominate, which leads to the construction of new operating models of companies, accentuating digital marketing, specifically in operations of promotion, sale, and delivery of goods/services, as well as the incorporation of digital interconnection devices in production processes and in the interaction with suppliers. This shows the effectiveness of digital channels during challenging times, as well as the high commitment and attitude of permanence. Likewise, online education has generated content to be consumed from home, using live broadcasts from Instagram, YouTube, Tik Tok, Twich, etc. As support, applications such as Instagram, Messenger, WhatsApp, and Telegram are used to channel promotional ads that boost and strengthen communication with customers and help attract new ones. According to Pérez-Calle et al. (2021, p. 8), "a set of resources and innovations of hardware, software, telecommunications or electronic devices linked to each other are grouped together, with the ability to generate between them a universal network or tools that allow accumulating data to synthesize and generate information".

In sum, entrepreneurship in the region has been greatly affected as a result of the obstacles that have been dragging it down for years, which have been exacerbated by the Covid-19 pandemic. In this outlook, the case of Ecuadorian entrepreneurship stands out, which occupied an important space from 2017 to 2019, due to the boom experienced in aspects such as the proportion of incipient entrepreneurs and new entrepreneurs, but with changes that are still in evolution as a result of the pandemic, for the period 2020-2021 (Global Entrepreneurship Monitor Ecuador, 2020).

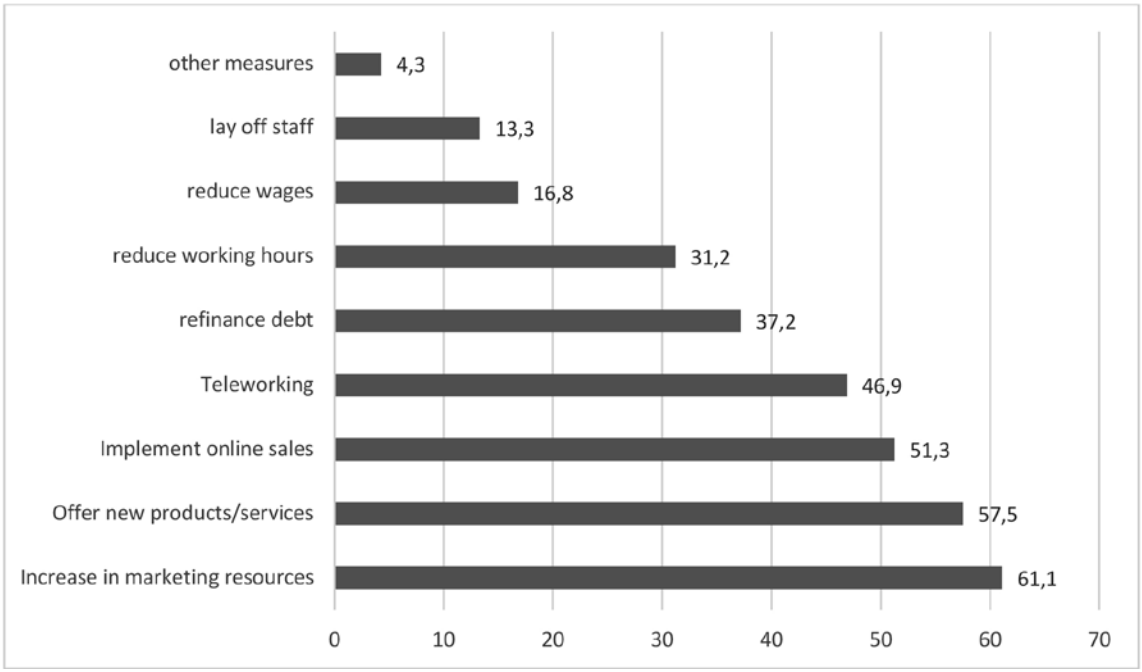
In this way, the Ecuadorian economic system has experienced imbalances in the face of a systemic crisis, from which neither the business sector nor the startups escape, due to "difficulties in accessing inputs, reduction or lack of qualified labor, difficult access to financing and production processes that are unable to adjust to short-term emergencies and be operated remotely or become automated" (Useche et al., 2021, p. 4). In this framework, Lasio et al. (2021, p. 33), argues that "53 % of those who generated sales have stopped their activities. In addition, 84% of entrepreneurs have seen their flow of funds decrease and 75% have decreased their productive activity". For Morán (2020, p. 15), the startups that have arisen are by necessity, and, therefore, have a low budget, "most of the startups do not exceed the first months of operation and 99% do not generate employment because they are for subsistence".

On the other hand, a large number of SMEs operate in the informal sector, due to costly bureaucratic procedures (Calá et al., 2015) that hinder the development of entrepreneurship in the country. Given this, in May 2020 "the Superintendency of Companies of Ecuador implemented the simplified stock company (SAS) and since then more than 5,200 simplified stock companies have been created" (De la Medina, 2021, p. 1), inserting themselves in the simplification and modernization of the business registry.

In 2020, the Organic Law of Entrepreneurship and Innovation (National Assembly, 2020a) was also approved, which promotes business activity in all sectors, the most benefiting being the wholesale and retail trade; professional, scientific, and technical activities, as well as the construction sector. This shows that Ecuador is undergoing a progressive transformation, according to Zamora-Boza (2018, p. 10) towards "the inclusion and support of entrepreneurs out of necessity and innovative entrepreneurs who take advantage of market opportunities".

With the SAS and the new law on entrepreneurship and innovation, entrepreneurship continues to be promoted; however, the pandemic has caused havoc, as "69 % entrepreneurs indicated having suffered a negative effect from the pandemic, and in relation to this, 23 % said they had been strongly affected by the crisis, with the risk of closing their businesses" (Lasio et al., 2020, p. 34). Given this, they implemented a series of measures, which can be seen in Figure 2.

Figure 2. Actions implemented during the pandemic



Source: Lasio et al. (2020).

Some of these actions point to solutions based on the use of digital services and the development of new business models (Garzón-Morales, 2020; Gallegos, 2020; Fitzpatrick et al., 2020; Zubillaga & Peletier, 2020; Pérez-Calle et al., 2021), which point to sustainability with digital transformation and the adoption of new public policies, to promote entrepreneurship and network growth, among others. However, e-commerce has been growing at a slow pace, perhaps due to fear of change and ignorance of new business methods; but with Covid-19 and:

> The suspension of activities by 70 %, had the need to activate this capacity for adaptation, and even so, the consolidation of electronic commerce indicates a path that is moderately explored in Ecuador and that is expected to increase in the medium term. (Rodríguez et al., 2020, p. 115)

On the other hand, for the United Nations High Commissioner for Refugees (UNHCR) and the United Nations Development Program (UNDP) (2020) it is also

necessary to increase working capital through loans, have the supplies necessary for production, communication campaigns focused on small businesses, training for the use of digital communications media, technological updating, alternative payment instruments to cash, home distribution channels and tax aid.

With a view to the economic recovery phase of Ecuador, public policies aimed at entrepreneurship must consider the obstacles that, together, prevent it from reaching its productive potential and face them. These are: unfair competition, lack of access to financing, little participation of the women in the labor market, little innovation, among others. In this sense, Heredia-Zurita and Dini (2021) indicate that the national government has created a set of initiatives from postcovid-19 public policies, with an orientation aimed at financing, credits, and liquidity.

Regarding financing, the Emprende Ecuador Productivo Fund was created to promote productive innovation, through two financial instruments: a) "growth" Capital (seed capital), based on a co-financed fund to support innovative ideas, and b) "progress" Capital (venture capital), leading to the consolidation and/or expansion of ventures that have innovative products/processes.

With a loan from the World Bank (USD 120 million), the national government made room for productive financing Mipymes-BM, to finance fixed assets of infrastructure, equipment/machinery, and working capital (USD 25,000) that include payment to suppliers and for microcredit. Likewise, the Bank of the Ecuadorian Social Security Institute (BIESS) invested (USD 50 million) in the Pyme Express program for quick loans to SMEs. Within this framework, the Reactívate Ecuador program requested a loan for USD 93.8 million from the Inter-American Development Bank, aimed at financing productive credit lines for the popular and solidarity economy sector.

> By July 2020, 2,056 approved credits were registered for an amount of USD 89.9 million, of which 54.1% corresponded to small companies, 38 % to medium-sized companies, and 7.9% to micro-companies. (Heredia-Zurita & Dini, 2021, p. 82)

In reference to liquidity, the Organic Law of Humanitarian Support (National Assembly, 2020b) contemplates payment agreements for businesses and individuals with their debtors, either client and/or suppliers for three years. Likewise, agreements were signed in reference to terms, reduction, capitalization, or restructuring of obligations; the payment of the 2019 Income Tax and the Value Added Tax (April, May, and June 2020) for micro-enterprises was deferred; temporary suspension of cuts due to non-payment of basic services of drinking water, electricity, telecommunications, and internet up to 60 days after the end of the state of exception decreed by the national government. Extraordinary deferral of credit obligations for up to 60 days without surcharges, among others.

Similarly, the aforementioned law encourages decentralized autonomous governments to open new ventures without requirements and to register them in the National Entrepreneurship Registry (RNE), in order to formalize and categorize them. On these aspects, Rodríguez, et al. (2020, p. 116) points out that "the policies implemented to help improve their financial situation and stay in the market are not working, many businesses complain that resources do not arrive and time is running out".

Now, to stimulate entrepreneurship with the participation of women "who seek to improve themselves and obtain better opportunities for the benefit of the families involved and of society, in general, that is committed to higher levels of development and the sustainability of their startups" (Delgado et al., 2020, p. 1231), the Organic Law project has been prepared to promote the work of women, equal opportunities and the violet economy, with emphasis "on those in greater difficulty, producers, micro-entre-

preneurs, entrepreneurs, artisans, and others, who have seen their resources reduced due to the health emergency caused by Covid-19" (Ministry of Economic and Social Inclusion, 2020, p. 1).

With this law, it is expected to minimize the precariousness, informality, and unemployment that affect Ecuadorian women, given that "the latest survey by the National Institute of Statistics and Censuses shows that, of the total unemployed, 56.4 % were women as of December, while last year the figure reached 50.5 %" (Enríquez, 2021, p. 1). As can be seen, entrepreneurship in the region is going through adverse times, in which there is also space for opportunities. In the case of Ecuador, steps have been taken to support entrepreneurship, with public policies and legal instruments; it is a process in action that has not yet shown results, in a historical moment of great challenges and technological changes.

4. Contributions to the state of the art

4.1. Digital entrepreneurship in Ecuador

The country has been experiencing deficiencies in telecommunications infrastructure and "currently, Ecuador is ranked 7th out of a group of 11 South American countries (which includes Mexico) in terms of internet account penetration" (Rivera et al.., 2020, p. 3). But despite this, there was a significant impact on the collaborative economy. Although Lasio et al. (2020, p.19) point out that in the Global Entrepreneurship Monitor Ecuador 2019/2020:

> (...) there is still no concrete data, it is known that during the COVID19 pandemic, the use of collaborative logistics platforms has had a great presence, enabling the continuity of businesses that had neither a digital payment system nor home deliveries, nor the resources to implement these functions.

According to the Ecuadorian Chamber of Electronic Commerce (2020, p. 15), since the appearance of Covid-19, investments have been made in advertising and product promotion, mainly aimed at social media "(61 %), messaging (36 %), Email (25%), Web page (29 %) "to boost sales through Streaming, Facebook, Shopify, Mercadolibre, Woocommerce, among others; however, "sales are decreasing by 56 %, they have completely stopped 32 % and have only grown by 12 %" (Ecuadorian Chamber of Electronic Commerce, 2020, p. 9). These changes in sales are due, especially, to increased unemployment and decreased purchasing power, lack of correspondence between the demand and supply of products.

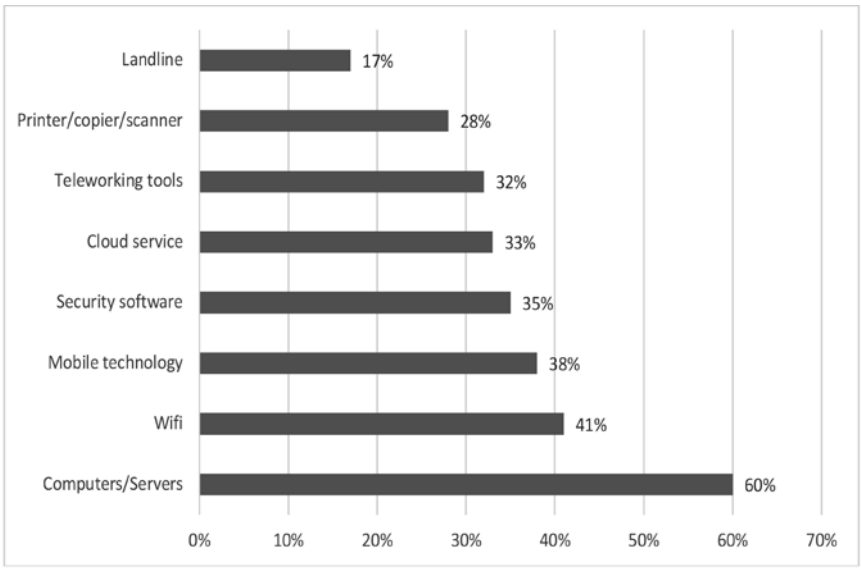
According to an investigation by OAS-Kolau, "digitized microenterprises in Ecuador do not exceed 10 %, with which it is determined that microenterprises are not using technologies to adapt to consumer habits" (ecuadortv, 2020, p. 1). This motivated the national government to reach an agreement with the Organization of American States on a digitalization plan for MSMEs, which "seeks to guide micro-entrepreneurs in the strategic use of technologies to close the existing consumption gap." (Ministry of Tourism, 2020, p.1). The plan provides for the training of MSMEs in the creation of a dynamic website that is positioned on Google maps, so that customers looking for a product or service online can find the store closest to their home and communicate with the provider. In this way, it is expected to benefit 10,000 businesses and introduce them to electronic commerce to reactivate the national economy (Ministry of Tourism, 2020).

Given these results, the proposal for the Law of Connectivity and Digital Transformation was drawn up, which aims to:

> Promote digital transformation, (…) the effective use of digital platforms, the use of data and digital technologies, networks, and digital services, in order to boost the digital economy, efficiency, and social well-being. (Ministry of Telecommunications and the Information Society, 2021).

In this sense, Pino (2020) affirms that if something is clear, it is the need to overcome "the inertia of defensive digitization, more concerned with protecting reputation than promoting it. We are living in a post-digital era that involves new communication challenges, and for which we need to decisively change focus" (pp. 155-156). Toranzos (2020, p. 1) highlights, in this sense, that "many businesses seek to move to digital environments", which is evidenced in Figure 3, which shows that investments are focused on the technology area.

Figure 3. Investments in 2021



Source: Digital Criteria (2021).

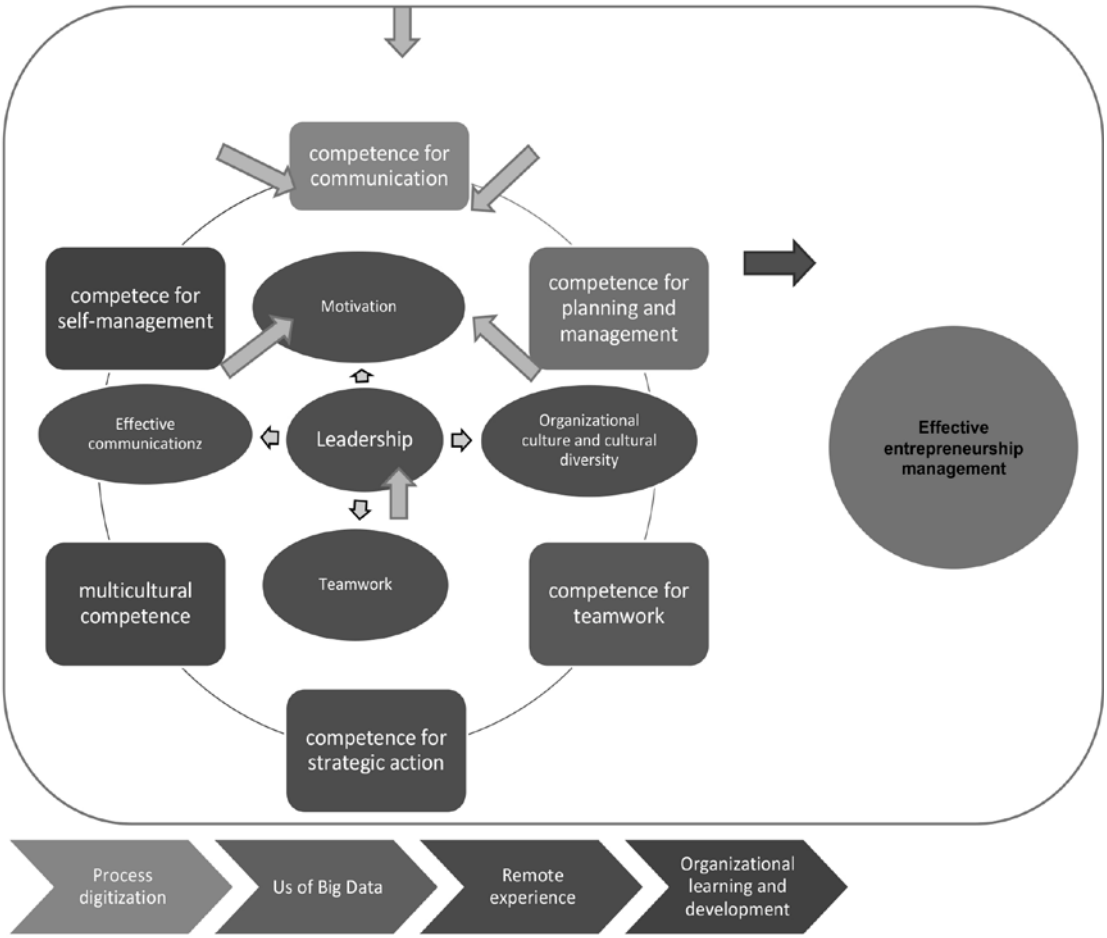
Within this framework of technological updating, in 2020 the Digital Pyme platform (http://www.pymedigital.ec/) was launched with the support of the Escuela Superior Politécnica del Litoral (2020), to promote digital transformation processes, promote digital skills to reduce operating costs, among others. This free tool allows SMEs to know their level of digital maturity, while issuing individualized results and recommendations for each SME. It can be argued that digitization is the opportunity to improve processes and prosper in a faster and more efficient way. With all these national advances, positive results and growth trends are expected. Therefore, it is necessary to plan the investment into new technologies to select the ideal one in accordance with the capacities and resources; which in turn will require digital literacy from entrepreneurs.

4.2. Changing to face change: Ecuadorian entrepreneurship with a view to the post-pandemic

In a historical moment like the present, change and uncertainty are permanent. For entrepreneurs, hesitation and even insecurity are present and questions arise about

the challenges they will face once certain stability is achieved or what has been called the 'new normal' (Terán-Yépez & Guerrero-Mora, 2020). In this sense, the Ecuadorian entrepreneur, in general, needs a systemic view of the organization and its environment that addresses the challenges (opportunities) that have been brewing before the pandemic and that have been driven by it: digitization of processes, use of Big data, remote experience, emphasis on organizational development and learning (Merizal & Ballagán, 2018; Ernst & Young 2020). The foregoing, within the framework of effective leadership and the implementation of a business model based on the development of labor competencies (Hellriegel et al., 2009), as can be seen in Figure 4, to achieve management effectiveness of entrepreneurship in the face of change; the latter expressed, currently, in the Covid-19 pandemic.

Figure 4. Business model based on labor competencies for the effective management of entrepreneurship in the face of change



Source: Own elaboration, based on Hellriegel et al. (2009).

However, achieving effective management in entrepreneurship, which allows facing the challenges and taking advantage of the opportunities of the turbulent environment, requires changes in the way of conceiving the business and its management. In this sense, it is necessary to have effective leadership, and in many cases, at a distance, which is capable of motivating, generating effective communication, and promoting diversity and teamwork (Hellriegel et al., 2009). In this regard, entrepreneurs at "the managerial level will have new traits, since their abilities require oxygenation

to respond to structural rearrangements, new ways of relating and managing", being essential the ability to adapt at each moment, process and phase that the Ecuadorian entrepreneurial activity experiences (Useche et al., 2020, p. 80).

However, for the International Labor Organization (2021) leadership is not enough, it also requires a team of people with competencies, abilities, and skills in tune with the present moment, which implies the adoption of labor competencies as a way of regular work. In this regard, Hellriegel et al. (2009) propose six core competencies to be developed: communication, planning and management, teamwork, strategic action, multiculturalism, and self-administration. With these resources developed (leadership and labor competencies), the startups have in their favor a solid platform to respond to the challenges and opportunities of the environment:

In the first place, the digitization of processes, which went from being an alternative to a necessity. In the midst of the pandemic crisis, suppliers and customers proved the tasted of technology applied to electronic commerce. The results of the study of the Kantar Covid-19 Barometer, showed the trend in the coming years towards the growth of electronic commerce compared to the traditional one, as a consequence of the increase in the non-face-to-face shopping pattern, which poses relevant challenges for commercialization through digital channels (Ecuadorian Chamber of Electronic Commerce, 2020).

In that sense, the percentage of online penetration of mass consumption in Ecuador was 44 %, and specifically, WhatsApp accounted for 15.2 % of that total during 2020. The foregoing is expressed in that "4 out of 10 Ecuadorians bought something of mass consumption in e-commerce during a mobile year until February 2021" (Kantar, 2021, p. 5). The results shown in the post-COVID shopping behavior are relevant, according to which 32 % will continue to buy online, 11 % increase online purchases, 17% will return to buying in physical stores, while 40 % will continue to go to the physical store, but less regularly. These data show the trend towards greater digitization of the Ecuadorian, which must be used by the entrepreneur to assume the technological challenge in their processes.

Second, the use of big data, consistent with the adoption of digitalization of processes, and better management of data and the massive information available, forces entrepreneurs to incorporate skills in managing big data, and establish criteria regarding changes in demand, updating of supply chains, among others. Thus:

> Intensifying the training in digital tools offered by information and communication technologies can pose a challenge for workers and leaders to ensure productivity and the achievement of set business objectives. (Madrid Chamber, 2020, p. 1)

Third, remote experience constitutes a form of work in which the collaborator executes their activities from a place other than traditional workspaces, using information and communication technologies (Hu-Chan et al., 2020; Molina, 2020; Ramírez-Velásquez et al., 2021). Although it is not a novelty, the confinement managed to catapult it as a trend, which looks irreversible; being a mechanism in the process of adaptation and change that has proven efficiency and with benefits for the organization and the collaborator. In Ecuador, Vargas (2020) points out, an important advance in this area begins in 2016, with the regularization of telework through Agreement No. MTD-2016-0190 (Ministry of Labor, 2016). Although it is not a novelty, the confinement managed to catapult it as a trend, which looks irreversible; being a mechanism in the process of adaptation and change that has proven efficiency and with benefits for the organization and the collaborator. In Ecuador, Vargas (2020) points out, an important advance in

this area begins in 2016, with the regularization of telework through Agreement No. MTD-2016-0190 (Ministry of Labor, 2016).

Fourth, organizational learning and development will become more important. Having and maintaining competitive differentiators is key at a time when competition is fierce and it is required to retain key personnel. Supporting the growth and development of employees is a source of differentiation that in turn promotes innovation and creativity. Training in key areas such as finance and technology is essential. It should be noted according to Maldonado-Román et al. (2019) that:

> In Ecuador, the implementation of public policies that regulate the development of these businesses (…) has led to public and private institutions promoting a culture of financial management, which constitutes support for entrepreneurs who have the need to get ahead and take advantage of market opportunities. (p. 121)

Ultimately, Ecuadorian ventures face great challenges, but also various opportunities, which involve generating changes in people, structures, and processes. The new scenarios require new forms of organization and leadership; renewed management models and adaptability. It is about acting strategically to take advantage of opportunities (Leite Gustmann de Castro et al., 2020), stimulating creativity and innovation in organizational methods and in ways of relating to the environment.

5. Discussion and conclusions

The challenges identified in the research entail changes and paradigm shifts in Ecuadorian entrepreneurs. Current scenarios require organizations with the capacity to adapt, focusing on people as driving forces of creativity and innovation, with renewed management models based on competencies, transformational leadership, among some aspects. It is about acting strategically to take advantage of the opportunities that arose in the crisis, stimulating the local economy, with a global effect.

In this context, Ecuador faces the challenge of stimulating the training of entrepreneurs in the digital field, expanding the infrastructure to facilitate and promote the digitization of ventures, because, in addition to being an immediate response to the country's economic crisis, it is an opportunity for reinvention and strengthening of post-pandemic digital capabilities, which in turn is expected to reduce the digital divide. For entrepreneurs, digitization has two aspects: digitization of processes and digitization of work, which will require changes in business models, structure, organizational culture, and labor relations from the startups themselves. This implies renewing the business vision and attending to change as an unquestionable premise.

From the governmental apparatus, and despite the progress made in the digitization of startups in the country, it is still necessary to improve and promote initiatives, assign responsible parties and goals, being favorable the creation of a government council dedicated to the efficiency of the digitalization, with measurable metrics and with a time schedule to achieve it, given that the sooner the adaptation of startups to the digital economy is achieved, the faster will be their insertion and connection with customers, and therefore, there will be visible progress in minimizing the crisis in Ecuadorian society. Based on this, the need arises for subsequent studies to monitor the achievements, limitations, and progress of digital entrepreneurship in post-COVID-19 Ecuador, where the changes or transformations are also evidenced, as well as innovation opportunities that have been identified in the face of the insertion of digital platforms in the operation and communication with the local, regional and national market.

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Customer experience, trust and loyalty of millennials in banking at Cuenca-Ecuador

Experiencia del cliente, confianza y lealtad de los millennials en el sector bancario de la ciudad de Cuenca-Ecuador

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Abstract

This paper aims to explain the effect of the banking customer experience on trust and the effect of the latter on customer loyalty, thus complementing previous research where it is suggested to clearly explore the nomological network of the constructs that act as mediators in the relationship between customer experience and customer loyalty. The sample consisted of 1231 users of the bank in Cuenca-Ecuador who are part of the generation known as millennials, a segment of interest due to their great attachment to technology and purchasing behavior. The structural equations model and PLS (Partial Least Square) software were used for data analysis. The results show that there is a significant effect of customer experience on trust in banking and in turn a similar effect between customer trust and loyalty. Furthermore, it is confirmed that trust represents a variable that precedes loyalty. The behaviors of millennials as they are knowledgeable about technology and experts in using the Internet to search and purchase products, show a relationship between the variables that are part of the proposed model that is applied in the banking sector.

Resumen

El objetivo de esta investigación fue explicar el efecto de la experiencia del cliente bancario sobre la confianza y el efecto de esta última sobre la lealtad del cliente, logrando así complementar investigaciones anteriores donde se sugiere explorar con claridad la red nomológica de los constructos que actúan como mediadores en la relación entre la experiencia del cliente y la fidelidad del mismo. La muestra estuvo conformada por 1231 usuarios de la banca de la ciudad de Cuenca-Ecuador que forman parte de la generación conocida como millennials, segmento de interés por sus características y comportamiento de compra. Para el análisis de los datos se utilizó el modelo de ecuaciones estructurales y el software PLS (Partial Least Square). Los resultados evidencian que existe un efecto significativo de la experiencia del cliente sobre la confianza en la banca y a su vez un efecto similar entre la confianza y lealtad del cliente; además, se confirma que la confianza representa una variable que antecede a la lealtad. Los rasgos y comportamientos de los millennials, conocedores de la tecnología e Internet, evidencian una relación entre las variables que son parte del modelo propuesto y aplicado en el sector bancario.

Keywords | palabras clave

Digital banking, trust, customer experience, loyalty.
Banca digital, confianza, experiencia del cliente, lealtad.

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1. Introduction

The appearance of the internet and its influence on society brought with it the modification of consumer behavior, many of the activities that in past decades were carried out only in person, today have been complemented with products and services offered virtually. The banking sector has, undoubtedly, been part of the early adopters of computer technology, therefore, of an accelerated evolution in the digital format (Agarwal, 2020). In this context, there are several researchers who agree that the perception of consumers, regarding the use of online banking, implies high levels of risk since the services linked to a technology emit unknown stimuli, and consequently, the consumers who decide to use Online banking services are immersed in a situation of uncertainty, which affects trust levels (Sarin et al., 2003).

In order to attract a greater number of clients and, above all, to retain current ones, several institutions opted for technological development. This advance in the banking sector and the economy are currently well known and add value to the service due to the link that they generate with users, going beyond the old banking of only products to focus on a new, dynamic, and customer-focused banking (Mahecha et al., 2019). Authors such as Pikkarainen et al. (2006) indicate that, in itself, electronic banking has shown constant growth in terms of value and volume.

The banking services sector has been heavily worked on at the academic research level; however, authors such as Kamath et al. (2019) state that several issues remain unclear, given that previous research such as that of Brakus et al. (2009) and Srivastava and Kaul (2016) have examined the link between customer experience and loyalty, confirming that there is a shortage of academic literature that examines the mediating role of these sequential variables, for which they suggest clearly exploring the nomological network of the constructs that act as mediators in the relationship between customer experience and loyalty (Kamath et al., 2019). Therefore, this research aims to explain the effect of customer experience on trust and the effect of the latter on customer loyalty. This work is divided into the following sections: literature review, methodology, results, discussion, and conclusions.

2. Literature review

2.1 Electronic banking as an advance in the banking sector

For several years, the banking sector made its service available to the community through the human factor, since it was always a person who provided service to users. The development of the areas of marketing, customer service, and process development, brought with it the introduction of electronic banking, this differentiating service provides customers with the ability to carry out financial transactions without the intervention of human beings; that is, it enables a user to access their bank accounts over the Internet and carry out a transaction (Safeena et al., 2013). The success of the innovations of this type of service depends to a large extent on the consumption patterns or trends of users of these services (Arora & Sandhu, 2018).

Electronic banking can be understood as the automatic supply of new and traditional banking products and services directly to customers, through interactive digital communication channels (Drigă & Isac, 2014). in this sense, the service process can be defined as the configuration of technologies through which service providers perceive and respond to the dynamic and complex needs of their clients using advanced technology (Dabholkar & Overby, 2005).

The multiple innovations, especially those developed in technology, resulted in a significant increase in digital commerce transactions, as well as the shift from physical contact to digital transactions. The progress of the banking sector and the economy are today well known for the linkage it achieves with users. According to Pikkarainen et al. (2006), the electronic banking system has shown constant growth in terms of value and volume.

2.2. Customer experience and trust in the banking sector

Every day users demand more in terms of attention and service; organizations make great efforts to provide the appropriate facilities for the development of a satisfactory experience with the brand. Along the same lines, Kavitha and Haritha (2018) define the customer experience as the perception of users about how an institution treats them, while authors such as Buttle (2008) and De-Keyser (2015) agree that the customer experience involves cognitive, emotional, physical, sensory, spiritual and social elements; that is, they understand it as the cognitive and affective result of the client's exposure or interaction with the people of a company, its processes, technologies, products, services, and others.

Creating a superior customer experience seems to be one of the central objectives in most current environments, companies around the world have adopted the concept of customer experience management and as a result, many incorporate this particularity in their mission statements. Regarding the construction of the customer experience, this is holistic in nature and involves customers, it is given not only by those elements that the supplier can control but also by elements that are outside the control of the supplier. The customer's experiencer encompasses the total experience, includes the search, purchase, consumption, and after-sales phases (Verhoef et al., 2009).

Researchers like Ali et al. (2018) and Slåtten et al. (2011) consider that the customer experience constitutes a multidimensional and diverse construct, developed by various elements that include the physical environment, interactions with staff, and interactions with other customers. For their part, Loureiro et al. (2014) emphasize that the emotions of customers, mainly delight, are natural components of their experience, so one of the keys is to provoke strong emotions and experiential reactions in the consumer, hence Slåtten et al. (2011) indicates that experiences are stored in memories, which generates a close link between them and their delight. In this sense, pleasant experiences can be considered a vital determinant of customer loyalty (Ali et al., 2018).

The importance of understanding the emotions of a user in the context of the service that is delivered will provide the possibility of creating mental footprints that contribute positively to the positioning of a brand (Slåtten et al., 2011). Therefore, a bank should focus on creating positive experiences in the factors that directly affect discretionary behaviors (Wasan, 2018). The neural part of customer experience management has been attributed to intensifying the relationship between companies and customers. In the service sector, it has been further evidenced by the strength of the interaction required by banking (Mbama et al., 2018).

On the other hand, trust has been worked on in various industrial sectors and defined from various perspectives. From virtual environments, Jarvenpaa et al. (2000) define trust in the online seller as the expectation of one of the parties about the motives and behaviors of the other party. Most of the investigations carried out in digital scenarios consider trust as a multidimensional construct formed by honesty, benevolence, and competence, which are fundamental in order to achieve satisfactory sales relationships in the aforementioned context (Doney & Cannon, 1997; San Martín & Camarero, 2010).

Honesty basically includes the belief that the other party will assume its commitments and obligations, that is, the fulfillment of the business partner's promises (Doney & Cannon, 1997). Benevolence, on the other hand, is the belief that the other party is interested in achieving mutual benefits and will not initiate actions that harm the relationship (Torres et al., 2009). Finally, competence constitutes the appreciation that the company has technical knowledge and experience that prove their knowledge about their field of activity, and which guarantees the conditions that they will do their job well and offer a product or service with the advertised quality (Bhattacherjee, 2002; Pavlou, 2003; Roy et al., 2001; Suh & Han, 2002). Micu et al. (2019) indicate that the online customer experience directly influences trust, which is why the following hypothesis is proposed:

H1: Customer experience directly and significantly affects trust.

2.3. Customer experience and trust in the banking sector

Trust in the context of online banking, can be seen as the belief that a consumer has in the ability of the Internet banking service provider to provide reliable services through the cloud, this means that one is willing to depend on the other party even though one can't control it. With the accelerated development of the virtual market, the role of trust has become predominant. Potential uncertainties come from multiple sources, such as the vulnerability of the Internet, Internet communication platforms, and the technical capacity of providers (Bashir & Madhavaiah, 2015).

Loyalty to a brand is perhaps one of the most important constructions in services, in fact, loyal customers who indulge in repeat purchases are the foundation of any business (Shamsuddoha & Alamgir, 2003). Customer loyalty can be understood as the continuous process that does not end with the satisfaction of the customer's need but continues with the generation of a long-term repeat purchase relationship with the customer in a particular brand, that is, the ability of a company to continue to win the patronage of a client over the competition (Omoregie et al., 2019).

The banking sector, in general, has shown strong competition in the world, and in order to guarantee its competitiveness in the industry, banks have focused their strategies on the retention and loyalty of their clients (Leninkumar, 2017). The service sector has faced radical changes during the last ten years, various strategies that have been developed, try to retain customers. In banking services, many of the brands have chosen to introduce new intangible and novel products that are harder to imitate (Shamsuddoha & Alamgir 2003).

Measuring customer loyalty includes dimensions such as attitude and behavior. Along the same lines, some authors point out that satisfaction, service quality, and trust have a significant effect on loyalty (Omoregie et al., 2019), also Gillani and Awan (2014) confirm a significant relationship between trust and customer loyalty, hence this study proposes the following hypothesis:

H2: Trust directly and significantly affects customer loyalty.

3. Materials and method

The focus of this research was quantitative, the design was explanatory and the cross-sectional research, the technique was the survey, the type of sampling was non-probabilistic and for convenience of a specific profile of participants, users (men and women) born between 1980 and 1993, banking clients (Banco del Pacífico, Banco del Austro, Banco Bolivariano, Banco General Rumiñahui, Banco de Guayaquil, Banco Internacional, Banco de Loja, Banco de Machala, Banco del Pichincha , Banco

ProCredit, Produbanco, Citibank, Banco Solidario) in the city of Cuenca, the third largest in Ecuador (INEC, 2019).

The information-gathering was carried out between the months of May and July 2020 and the study focused only on people who are part of the generation known as millennials since the specific behavior of this group is of interest, which according to Cleyle et to the. (2006) integrates those who have a completely new set of expectations and requirements compared to previous generations, given that they grew up with technology; that is to say, in the middle of the information age.

The millennial generation is known for certain traits and behaviors that can influence their purchasing decisions, in addition to being tech-savvy, they are experts in using the Internet to search and purchase products, they use it as their main source of information and they trust it, they care about the environment and social responsibility issues, they seek and expect to see advertising that includes race and gender diversity (Nowak et al., 2006). Their nature is very optimistic, practical and are characterized by the belief that they can make a difference in the world (Lancaster & Stillman, 2002).

The survey was designed based on several constructs, it included 35 items. As part of the "customer experience" construct proposed by Wasan (2018), six dimensions were considered. Convenience was measured using six items, competence and compassion through three items each, and credibility, context, and personalization, with four items respectively. Loyalty was measured using five items suggested by Moliner et al. (2019) while trust was analyzed by means of six items that meet what was indicated by Kaur and Arora (2020).

The instrument included the Likert measurement scale with an interval between 1 and 5 points, it was previously validated with Cronbach's Alpha and confirmed with a pilot test. The sample consisted of 1231 cases and the structural equations model and PLS (Partial Least Square) software were used for data analysis.

This model establishes the dependency relationship between variables, that is, it tries to integrate a set of linear equations and establish which of them are dependent or independent of others. It allows to examine all the relevant variables simultaneously and in addition to this, to evaluate the theoretical model of the research and the significance of the hypotheses. It involves the measurement model, in which the factor loadings of the observable variables are analyzed in relation to their corresponding latent variables, in this structure the reliability and validity of the theoretical model measurements are evaluated (Sáenz & Tamez, 2014).

It also contemplates a structural model in which the causal relationships between the independent and dependent latent variables are analyzed. Latent variables are those that cannot be measured directly (exogenous variables) and that act as predictor variables of endogenous constructs (Sáenz & Tamez, 2014).

4. Results

4.1. Evaluation of the measurement model

Table 1 provides information on the demographic profile of the respondents based on a complete sample of banking users in the city of Cuenca, Ecuador and who are part of the generation known today as millennials. In the evaluation stage of the measurement model, we carried out several analyzes to confirm the reliability and validity of the data. In the first instance, a confirmatory factor analysis (CFA) was performed and the reliability of the measurement scales, convergent validity, and discriminant validity were tested. According to the findings, it is necessary to indicate that the dimension

"competence" part of the construct "Customer Experience" was eliminated because it did not comply with the minimum loads of 0.50 suggested by Bagozzi et al. (2013).

Table 1. Demographic information of the respondents

Variable	Category	Frequency	Percentage
Gender	Male	598	49 %
	Female	633	51 %
Education level	Basic education	117	9.5 %
	high school	410	33.30 %
	Third level	600	48.74 %
	Fourth level	104	8.45 %
Housing Type	Luxury suite	11	0.89 %
	Room (s) in rented house	97	7.88 %
	Leased apartment	273	22.17 %
	Own house / apartment	825	67.01 %
	Hut / Other	25	2.03 %
Number of vehicles	0	399	32.41 %
	1	555	45.09 %
	2	223	18.12 %
	3	40	3.25 %
	Over 3	14	1.14 %
Internet service	Yes	1165	94.64 %
	No	66	5.36 %
Age	Average	32.27	
	Minimum age	27	
	Maximum age	40	
Sample size	n:	1231	100 %

The results shown in Table 2 show the internal consistency achieved since all the item loads meet the minimum cut-off point of 0.50 suggested by Bagozzi et al. (2013), the composite reliability (CR) of all the constructs, as well as the average variance extracted (AVE), were greater than 0.70 and greater than 0.50, respectively (Chin, 2010; Fornell & Larcker, 1981).

In the case of discriminant validity, which is shown in Table 4, the criterion proposed by Fornell and Larcker (1981) was used, the AVE value evidenced the inter-correlation of the construct with others in the research model. All the values were greater than the correlation of each of the constructs (Chin, 2010). The results, therefore, show that the measurement model was satisfactory and provided sufficient evidence in terms of reliability, convergent validity, and discriminant validity. The determination coefficient (R^2) for confidence was 0.615 and for loyalty was 0.603 (for the complete sample),

which explains in all cases more than 60 % of the construct, respectively. All these R^2 values indicate a substantial pattern.

Table 2. External loads, CR and AVE

Construct	Dimensions	Items	External Loads	Composite reliability	Average extracted variance (AVE)
Customer experience	Compassion	COMPA1	0.757	0.864	0.681
		COMPA2	0.835		
		COMPA3	0.878		
	Context	CONT1	0.859	0.916	0.731
		CONT2	0.880		
		CONT3	0.857		
		CONT4	0.821		
	Convenience	CONV1	0.633	0.880	0.597
		CONV2	0.799		
		CONV3	0.795		
		CONV4	0.814		
		CONV5	0.807		
	Credibility	CRED1	0.849	0.901	0.695
		CRED2	0.842		
		CRED3	0.846		
		CRED4	0.798		
	Personalization	PERS1	0.739	0.898	0.689
		PERS2	0.875		
		PERS3	0.850		
		PERS4	0.850		
Trust		CONF1	0.856	0.932	0.697
		CONF2	0.864		
		CONF3	0.869		
		CONF4	0.873		
		CONF5	0.709		
		CONF6	0.824		
Loyalty		LOYAL 1	0.748	0.920	0.698
		LOYAL 2	0.860		
		LOYAL 3	0.836		

Note: The competence dimension was eliminated due to its low external loads.

Table 3. Discriminant Validity of the Constructs-Cross Loads

	Compassion	Trust	Context	Convenience	Credibility	Personalization	Loyalty
Compa1	0,757	0,496	0,664	0,562	0,525	0,494	0,532
Compa1	0,757	0,496	0,664	0,562	0,525	0,494	0,532
Compa2	0,835	0,579	0,554	0,554	0,657	0,674	0,677
Compa2	0,835	0,579	0,554	0,554	0,657	0,674	0,677
Compa3	0,878	0,592	0,662	0,598	0,647	0,665	0,664
Compa3	0,878	0,592	0,662	0,598	0,647	0,665	0,664
Conf1	0,567	0,856	0,580	0,558	0,567	0,605	0,655
Conf2	0,607	0,864	0,606	0,585	0,587	0,628	0,670
Conf3	0,555	0,869	0,552	0,558	0,581	0,609	0,654
Conf4	0,594	0,873	0,594	0,593	0,609	0,652	0,680
Conf5	0,424	0,709	0,392	0,414	0,498	0,562	0,554
Conf6	0,613	0,824	0,607	0,586	0,561	0,610	0,668
Cont1	0,678	0,591	0,859	0,613	0,562	0,599	0,621
Cont1	0,678	0,591	0,859	0,613	0,562	0,599	0,621
Cont2	0,672	0,591	0,880	0,593	0,559	0,594	0,627
Cont2	0,672	0,591	0,880	0,593	0,559	0,594	0,627
Cont3	0,644	0,558	0,857	0,566	0,547	0,609	0,636
Cont3	0,644	0,558	0,857	0,566	0,547	0,609	0,636
Cont4	0,594	0,551	0,821	0,537	0,504	0,562	0,593
Cont4	0,594	0,551	0,821	0,537	0,504	0,562	0,593
Conv1	0,420	0,358	0,494	0,633	0,327	0,318	0,347
Conv1	0,420	0,358	0,494	0,633	0,327	0,318	0,347
Conv2	0,553	0,547	0,538	0,799	0,527	0,542	0,577
Conv2	0,553	0,547	0,538	0,799	0,527	0,542	0,577
Conv4	0,552	0,535	0,486	0,795	0,598	0,570	0,617
Conv4	0,552	0,535	0,486	0,795	0,598	0,570	0,617
Conv5	0,576	0,552	0,550	0,814	0,548	0,526	0,571
Conv5	0,576	0,552	0,550	0,814	0,548	0,526	0,571
Conv6	0,557	0,537	0,550	0,807	0,614	0,575	0,598
Conv6	0,557	0,537	0,550	0,807	0,614	0,575	0,598
Cred1	0,583	0,535	0,476	0,575	0,849	0,620	0,617
Cred1	0,583	0,535	0,476	0,575	0,849	0,620	0,617
Cred2	0,632	0,572	0,550	0,601	0,842	0,628	0,627
Cred2	0,632	0,572	0,550	0,601	0,842	0,628	0,627
Cred3	0,644	0,595	0,546	0,573	0,846	0,665	0,646
Cred3	0,644	0,595	0,546	0,573	0,846	0,665	0,646
Cred4	0,613	0,567	0,548	0,543	0,798	0,620	0,616
Cred4	0,613	0,567	0,548	0,543	0,798	0,620	0,616
Loyal1	0,602	0,590	0,541	0,521	0,581	0,651	0,748
Loyal2	0,649	0,681	0,659	0,633	0,647	0,710	0,860
Loyal3	0,585	0,628	0,528	0,546	0,622	0,700	0,836

	Compassion	Trust	Context	Convenience	Credibility	Personalization	Loyalty
Loyal4	0,674	0,683	0,661	0,642	0,641	0,676	0,872
Loyal5	0,660	0,659	0,628	0,624	0,646	0,673	0,856
Pers1	0,522	0,550	0,577	0,499	0,529	0,739	0,553
Pers1	0,522	0,550	0,577	0,499	0,529	0,739	0,553
Pers2	0,685	0,640	0,620	0,594	0,684	0,875	0,716
Pers2	0,685	0,640	0,620	0,594	0,684	0,875	0,716
Pers3	0,614	0,586	0,512	0,527	0,624	0,850	0,675
Pers3	0,614	0,586	0,512	0,527	0,624	0,850	0,675
Pers4	0,642	0,649	0,588	0,584	0,675	0,850	0,753
Pers4	0,642	0,649	0,588	0,584	0,675	0,850	0,753

Table 4. Discriminant Validity of Constructs. Fornell and Larcker criterion

	Compassion	Trust	Context	Convenience	Credibility	Personalization	Loyalty	
Compassion	**0,825**							
Trust	0,675	**0,835**						
Context	0,758	0,670	**0,855**					
Convenience	0,692	0,662	0,676	**0,772**				
Credibility	0,741	0,681	0,636	0,688	**0,834**			
Personalization	0,745	0,732	0,692	0,666	0,760	**0,830**		
Loyalty	0,760	0,777	0,724	0,712	0,752	0,816	**0,835**	

Note: The diagonal values represent the square root of the average variance extracted (AVE) while the other entries represent the correlations.

4.2. Evaluation of the structural model

En la Table 5 se presentan los resultados de las pruebas de hipótesis. La regla general para la prueba de hipótesis de una cola es que el valor de t debe exceder 1.965 ($p < 0.05$). Se pudo evidenciar que la experiencia del cliente tiene un efecto positivamente significativo en la confianza (H1) y a su vez esta en la lealtad (H2), tal como se muestra en la Figura 1. Además, todas las dimensiones que son parte de la experiencia del cliente y fueron evaluadas, muestran una robustez significativa del constructo mencionado.

Table 5 presents the results of the hypothesis tests

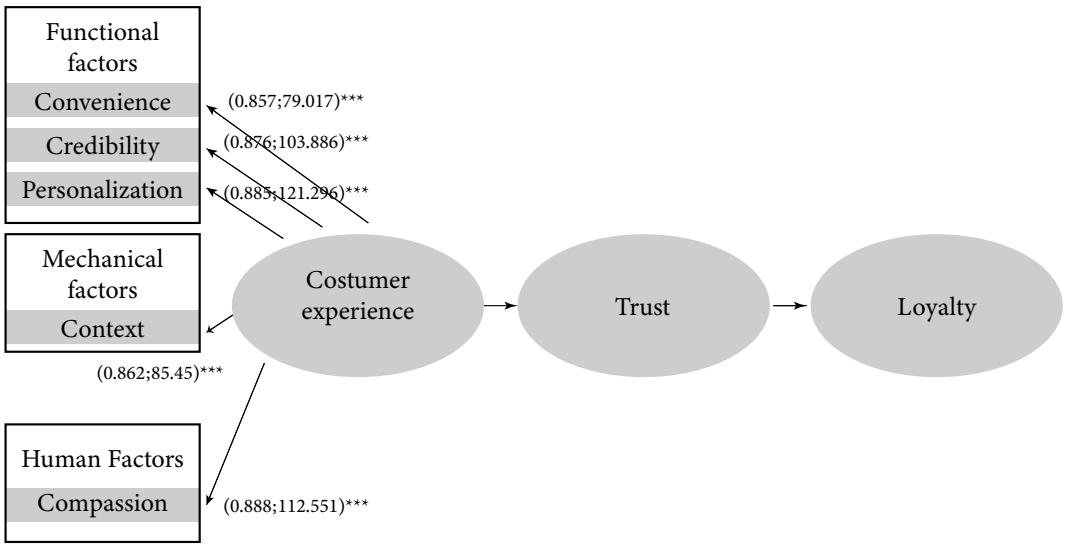
Hypothesis	Path	Beta	t Statistics	p Values
H1	Customer experience -> Trust	0,784	53,623	0,000
H2	Trust -> loyalty	0,777	47,777	0,000

It is necessary to mention that as an additional predictive criterion to R^2, authors such as Leguina (2015) recommend the Q^2 analysis in order to assess the predictive relevance of the structural model. In this regard, Chin (1998) mentions that the predictive relevance of the constructs must be positive and with values greater than zero; where values of 0.02 can be considered as small values, values of 0.15 as mean values, and values 0.35 as large values, in order to consider the predictive validity of the model. Geisser (1974) and Stone (1974) recommend evaluating the Stone-Geisser test as a Q^2 criterion. This investigation used the blindfolding procedure in PLS. The endogenous constructs had a strong prediction since Q^2 had a value of 0.42 for the trust construct and a value of 0.42 for loyalty. Finally, Table 6 details the indirect effects between experience and loyalty.

Table 6. Indirect experience-loyalty effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	t Statistics (| O/ STDEV|)	P Values
Customer experience -> loyalty	0,609	0,610	0,022	27,070	0,000

Figura 1. Modelo estructural propuesto



5. Conclusions and discussion

Much research has been done regarding customer experience, trust, and loyalty; Micu et al. (2019) indicate that the online customer experience directly influences trust while Omoregie et al. (2019) and Gillani and Awan (2014) agree that the relationship between trust and loyalty is significant, however, the constructs that mediate between

customer experience and loyalty have not been explored, as suggested by Kamath et al. (2019). In this sense, this work tried to fill the gap described above.

When evaluating the customer experience, it was found that the dimensions of convenience, credibility, personalization, context, and compassion strengthen the construct. The effect of all of them on the customer experience is extremely strong and positive. As Wasan (2018) indicates, although the judgment is made by clients about their general experience of the service, it is formed by considering several functional, human, and mechanical factors; the first of them is measured, particularly, in terms of its reliability and competence. This is interesting given that this investigation confirmed that the dimension of competition was not representative of the customer experience.

The structural evaluation results reported in Table 5 (results for direct relationship) demonstrate that customer experience had a significantly positive effect on trust. Based on what was proposed by Slåtten et al. (2011) who indicate that the keys when building a better user experience are to provoke emotions and experiential reactions from the consumer, generating a close link, it can be considered that as indicated by Ali et al. (2018) pleasant experiences can be determinants of customer loyalty, therefore, generating trust as well.

In the case of trust, it had a significantly positive effect on the loyalty of millennials, specifically in the banking sector. The results are consistent with the conclusions of Gillani and Awan (2014) who confirm a significant relationship between trust and customer loyalty, which shows that trust represents a variable that precedes loyalty. The traits and behaviors of millennials, being technology savvy and experts in using the Internet to search and purchase products, show a relationship between the variables that are part of the proposed model applied in the banking sector.

In conclusion, the study highlights in the first instance the reliability of the customer experience construct because its structure —which considers functional, mechanical, and human factors— is consistent. The effect of the customer's experience on trust is very strong, which is why it is confirmed that the creation of memorable memories throughout the entire service process collaborates in the generation of trust on the part of the millennials of the city of Cuenca. The effect of trust on loyalty is strong and positive, therefore that bank users, once they experience trust in the service, begin to build loyalty relationships with the brand.

Banks increasingly understand the relationship between the constructs that are part of the model and are making efforts to improve the user experience in both physical and virtual formats. This research contributes significantly to the banking sector, since it provides vital information for the creation of competitive advantages in the sector and for the development of strategies that increase the loyalty of current users.

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Assessment of generic competences of entrepreneurial behavior

Evaluación de las competencias genéricas del comportamiento emprendedor

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Abstract

Entrepreneurship as a social phenomenon has interested psychology for its study, one of its approaches is the entrepreneurial behavior from the competences, among them the generic / transversal ones. However, an area of opportunity in the literature is the assessment of competences for their fundamental characteristics of observable and demonstrable behaviors through experience. The objective of this study was to design and test the psychometric properties of an instrument for measuring generic entrepreneurial competences. The study was cross-sectional and instrumental with a non-random sample of 142 participants. The instrument was based on a model of three categories of generic competences (personal, interpersonal, functional), as well as on the logic of a behavioral interview and behavioral scale; It was made up of 14 items with four performance gradients where the participant had to respond based on his experience. The Exploratory Factor Analysis yielded a theoretically congruent three-dimensional structure that explains 53.8% of the accumulated variance. The coefficients Alpha de Cronbach (α) y Omega de McDonald (ω) showed adequate internal consistency higher than .80. No configuration, metric or structural invariance was detected between people who have or have not opened businesses. It is concluded that the instrument has the appropriate psychometric properties to continue testing in business entrepreneurs among other entrepreneurship contexts from the behavioral perspective oriented towards competencies.

Resumen

El emprendimiento como fenómeno social ha interesado a la psicología para su estudio, uno de sus enfoques es el comportamiento emprendedor abordado desde las competencias, entre estas las genéricas/transversales. Sin embargo, un área de oportunidad en la literatura es la evaluación de competencias por sus características fundamentales de comportamientos observables y demostrables a través de la experiencia. El objetivo de este estudio fue diseñar y probar las propiedades psicométricas de un instrumento de medición de competencias genéricas del comportamiento emprendedor. El estudio fue transversal e instrumental con una muestra no aleatoria de 142 participantes. El instrumento se basó en un modelo de tres categorías de competencias genéricas (personal, interpersonal, funcional), así como en la lógica de una entrevista conductual y escala conductual; se compuso de 14 reactivos con cuatro gradientes de desempeño en donde el participante debía responder con base en su experiencia. El Análisis Factorial Exploratorio arrojó una estructura de tres dimensiones congruentes teóricamente que explican el 53.8 % de la varianza acumulada. Los coeficientes Alpha de Cronbach (α) y Omega de McDonald (ω) mostraron consistencia interna adecuada superior a .80. No se detectó invarianza configural, métrica o estructural entre personas que han abierto o no negocios. Se concluye que el instrumento cuenta con las propiedades psicométricas adecuadas para seguirse probando en emprendedores de negocios entre otros contextos de emprendimiento desde la perspectiva comportamental orientada hacia las competencias.

Keywords | palabras clave

Entrepreneurship, entrepreneur, entrepreneurial behaviour, competencies, generic competences, assessment, validity, reliability.
Emprendimiento, emprendedor, comportamiento emprendedor, competencias, competencias genéricas, evaluación, validez, confiabilidad.

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1. Introduction

Entrepreneurship is considered an economic, social, and psychological phenomenon through which development opportunities are created not only for the entrepreneur but for their social environment by strengthening the economy, stimulating sustainable development, and generating decent and productive work in their environment as a result of their entrepreneurial action (International Labor Organization, 2014). This means that both the public and private sectors are interested in promoting entrepreneurship among citizens of different nations through public policies or institutional efforts such as entrepreneurial education to encourage people to do it (Mejía-Ordoñez et al., 2017). Similarly, this vision of entrepreneurship drives academic research activity around the phenomenon as a way of contributing to its understanding and development for society.

In this sense, the study of entrepreneurship has been carried out from an interdisciplinary perspective, which is consistent with the nature of the phenomenon itself, since it involves economic, political, social, and individual factors. In the latter, psychology has investigated entrepreneurship from different aspects, such as the approach of the cognitive components when studying the entrepreneurial attitude, intention, and orientation as direct interaction with the opportunities of their environment (Tornikoski & Maalaoui, 2019), and the approach of the entrepreneurial trait profiles that predispose to the entrepreneurial action and are activated when the situation warrants them (Kerr et al., 2018). On the other hand, the approach oriented to entrepreneurial behavior assumes that, through the formal or informal learning experience, the entrepreneur incorporates in his behavioral repertoire the series of abilities, skills, knowledge, and aptitudes that will allow him/her to effectively respond to the entrepreneurial tasks when required (Bird & Schjoedt, 2009; Gruber & MacMillan, 2017; Teague & Gartner, 2017).

With this principle, entrepreneurial action can be understood as a situational happening whose demand falls on: 1) the opportunities of the environment to promote the transmission and development of theoretical-practical knowledge, and 2) the ease offered by the environment to develop entrepreneurship.

In the case of business entrepreneurship, the first condition is, for example, understood as access to formal or informal learning of the individual regarding the opening of businesses (Yanchatuña et al., 2018) while the second condition in the same case, can be exemplified with the political-social conditions of the environment that facilitate creating a business (Matíz & Mogollón-Cuevas, 2008; Messina & Hochsztain, 2015).

The situational component is considered to be a condition external to the entrepreneur, over which he/she lacks direct control. On the other hand, the component that the entrepreneur can use for his entrepreneurial activity falls on his/her internal resources. From the entrepreneurial behavior, having these resources implies that the individual will have the ability to identify and take advantage of the possibilities of their environment, invest their efforts in mobilizing their opportunities, and in achieving their goal. These internal resources are learned, acquired through experience, tested, and constantly modified, in addition to being observed and validated by others (Bird & Schjoedt, 2009).

This conception of entrepreneurship understood as a behavior arises when it is observed that the attributes of the entrepreneur expressed by the economy and later studied by psychology from personality traits, do not respond to the phenomenon with consistency, so this approach suggests that entrepreneurship is a process and not a

question of attributes, in which the attributes of the person have an auxiliary but not leading role in the entrepreneurship process (Gartner, 1988), in this way it is understood that entrepreneurship is a process by which The entrepreneur executes a series of actions and does what is necessary so that the things that are proposed effectively happen (Ortiz-Valdés, 2020), this set of actions is called entrepreneurial behavior.

The study from this aspect has focused on distinguishing the concrete actions that an entrepreneur must execute to achieve their objective, for this, the activities of the people who are in such process are explored, which has resulted in a series of activities such as serious thoughts of starting the company, investing your own money for the new company, starting to save money for the company, starting to develop the business model (Gartner & Carter, 2010; Teague & Gartner, 2017), as well as searching for insertion opportunities; recognition of business opportunities when they arise; knowing the market, the industry, as well as potential clients; extend and expand social support networks, caring for their quality (Baron, 2007).

In addition to identifying activities within the entrepreneurship process, this behavior-centered approach has explored the series of competencies that are expressed in entrepreneurial action, since competencies are far from being isolated and concrete tasks or activities, but rather qualities that allow the individual to respond effectively in a situation (Mitchelmore & Rowley, 2010). In this sense, it is said that someone is competent for this or that thing when, as a result of the experience, they possess a series of behaviors that, to a greater extent, allow them to act appropriately in a situation (Ribes, 2006).

From this perspective, several researchers have focused on elucidating the series of competencies that are required for the entrepreneurship process. For example, Hodzic (2016), through a quantitative and qualitative analysis of interviews, identified a list of 20 competencies for entrepreneurship, among which were: having a vision and sharing it with others, identification of market opportunities, product development or services appropriate to the chosen market niche, negotiation skills, leadership skills, decision-making, understanding, analysis, and problem-solving, oral and written communication skills, teamwork, among others. Another example of establishing competencies for entrepreneurship is the work of Morris et al. (2013) who sought consensus among different entrepreneurship experts through the Delphi technique. In this case, the result was a model of thirteen competencies among which were: recognition of market opportunities, evaluation of opportunities, risk management or mitigation, the transmission of convincing vision, tenacity or perseverance, creative problem solving or imagination, among others.

However, it is observed that these competencies proposals in their definition and constitution limit entrepreneurship only to the creation of profit-making companies, leaving aside other expressions of entrepreneurship (Gruber & MacMillan, 2017) such as social, organizational, academic, among others (Gámez-Gutiérrez, 2013; Pertuz, et al., 2021; Salinas & Osorio, 2012). For these reasons, we took another approach to entrepreneurial behavior for this study which consists of generic competencies, which have the quality of being transversal in different fields of action and that are necessary to solve problems or demands in various contexts (Villa & Poblete, 2007). These competencies arise from the categorization proposed by the Tuning project in which two types of competencies are distinguished, the technical or specific competencies that are typical of a profession and the generic or transversal competencies that are indistinctly presented from the first (González & Wagenaar, 2006; Martín-Varés, 2006).

Thus, for the purposes of this study, entrepreneurial behavior is defined as a behavioral tendency derived from a series of generic competencies aimed at modifying

the present situation of an individual to attain an achievement in a given context, such as a personal goal or objective. This implies that the applicability of entrepreneurial behavior is observed in contexts other than business, such as social, organizational, academic, among others.

However, to identify the competencies in the entrepreneur's behavioral repertoire, a competency assessment strategy must be derived that addresses the main quality of the competencies of being based on an observable and demonstrable behavioral component, in addition to the fact that they can only be inferred through the performance of the individual (Hager et al., 1994), this seems to be one of the main problems in competency-based behavior research (Bird & Schjoedt, 2009; Mitchelmore & Rowley, 2010).

For their evaluation and training, Demchuk et al. (2015) mention that a process of decomposition of the competencies into the capacities and abilities that integrate them must be carried out, identifying an indicator of mastery that describes the deployment of competence in solving problems related to the context of application, as well as specifying the practical and theoretical knowledge that the individual will require to cover the competition. The author also mentions that after the decomposition of the competence, performance grades should be assigned that range from minimal to advanced performance. Schelfhout et al. Agree on this. (2016) when mentioning that the competencies must be operationalized and presented with mastery indicators, which will function as descriptions of observable behavior that demonstrate the degree of presence of the competence. The authors also mention that Likert-type scales contradict the nature of competencies since they focus on the evaluation of attitudes rather than observable behavior, which is why they should be avoided in research on competency-based behavior.

Therefore, the objective of this study was to design, validate and make reliable a measurement instrument that would allow identifying the presence and magnitude of generic competencies for entrepreneurship, in order to test the applicability of generic competencies in the phenomenon of entrepreneurship of business and for other purposes. Specific objectives include the generation of a measurement instrument based on behavior and mastery indicators, as well as testing the psychometric properties of said instrument to measure generic entrepreneurial behavior competencies.

2. Materials and method

Non-experimental, cross-sectional, and instrumental study aimed at the design and testing of the psychometric properties of an instrument to measure the generic competencies that make up entrepreneurial behavior.

2.1. Participants

A non-random convenience sample of 142 participants was used. 56 % were women while 44 % were men. The age range was from 20 to 68 years ($\overline{x}$= 39; s = 11.67). 11% had a high school degree, while 6 % had a technical career, 50 % of the sample had a university degree level, 25 % had a master's degree, and 8 % had doctoral studies. Regarding marital status, 43 % were single, 32 % married, 2 % widowed, 7 % divorced, and 16% in consensual union. On the other hand, 47 % mentioned not having economic dependents, while 46% had between one and three economic dependents, and the remaining 7 % had four to six economic dependents.

Regarding work experience, 25 % were between one to five years, 18 % were between five to ten years, 16 % were between ten and 15 years, 13 % were 15 to 20, while 27 % had More than 20 years of experience. Regarding their social condition,

11 % expressed being a migrant (living in a place other than the one where they were born or raised) while the remaining 89 % did not. Regarding the education received, 9 % expressed having received private education throughout their lives, 50 % public, and 41 % mixed. On the other hand, 52 % of the sample expressed not having opened businesses, while 48 % expressed having established at least one business (range of businesses = 1-6).

2.2. Instrument

An instrument of Generic Competencies for Entrepreneurial Behavior (CG-CE) was designed based on a previous study (Quezada, et al., 2021), the logic of a behavioral interview (Salgado, et al., 2004), and behavioral scale (Doğan & Uluman, 2017), as well as in the recommendations for the evaluation of competencies based on behavioral indicators and performance levels (Demchuk et al., 2015; Schelfhout et al., 2016).

The instrument was made up of 14 items divided into three dimensions of competencies:

- Personal (CP): 1) generate new ideas; 2) adapt to an adverse environment; 3) work proactively; 4) confidence in one's actions and decisions; 5) work in a disciplined manner.
- Interpersonal (CI): 1) Collaborate with others; 2) seek and reach agreements; 3) looking for others to work; 4) mobilize others; 5) organize work for others.
- Functional (CF): 1) time management; 2) Troubleshooting; 3) decision making; 4) project planning.

In each item, a situation that could have been presented to the participant and four possible outcomes were presented as a stimulus, taking up the performance gradients of the generic competencies, the participant had to choose between the outcome that was closest to their experience.

2.3. Procedure

The CG-CE instrument was digitized using Google Forms, also integrating an informed consent and sociodemographic data section. The instrument was distributed by digital means through social networks to the general public and by email to institutional links with entrepreneurship departments in order to maintain the social distancing measures decreed by the Government of Mexico derived from the Covid-19 pandemic. The approximate response time was 20 minutes, and the data collection lasted three months.

2.4. Data analysis

The collected data were processed and analyzed with the IBM SPSS version 25 and Amos 24 programs. First, an Exploratory Factor Analysis (EFA) was carried out to determine the internal structure of the instrument and its congruence with the proposed theoretical proposal (Hair et al., 1999; Lloret-Segura et al., 2014; Pituch & Steven, 2015), then the Cronbach's Alpha coefficient was calculated in addition to the McDonald's Omega coefficient per factor and for the general instrument in order to provide evidence on the internal consistency of the items (Ventura-León & Caycho-Rodríguez, 2017). Finally, the invariance of the factorial structure was analyzed with Multigroup Structural Equation

Modeling (Byrne, 2008; Van de Schoot et al., 2012). The invariance analysis was performed comparing people with and without open businesses.

2.5. Ethical considerations

For the participation of business entrepreneurs, informed consent was used, which expressed the objective of the study, the limit of their participation, the voluntary nature of participation, as well as the confidentiality and privacy for the data provided. Similarly, the consent expressed the identity of those responsible for the research, their affiliation data, as well as the strictly academic and research purpose of the questionnaire.

3. Results

A preliminary analysis of the data was carried out, the initial sample consisted of 148 cases, of which six lost cases were identified due to errors in the measurement process with Google Forms, which we decided to eliminate because they were considered lost due to random phenomena, not related to the study variables (Bland, 2015; Hair et al., 1999). Subsequently, the viability of the EFA was analyzed to determine if the data allowed the interpretation of the analysis, for this, the correlation matrix was used at first, with which it was identified that the CP3 reagent "Work Proactively" correlated only with one reagent of its theoretical dimension and it did not do so with the rest of the items, which violates the assumptions of the conformation of factors and it was decided not to include the item in the analysis (Pituch & Stevens, 2015), the rest of the items presented low to medium significant correlations, so we proceeded with the exercise (See table 1).

Table 1. Correlation matrix 14 items CG-CE

	P1	P2	P3	P4	P5	I1	I2	I3	I4	I5	F1	F2	F3	F4
P1														
P2	0.148													
P3	0.148	0.150												
P4	.173*	0.079	.330**											
P5	.458**	0.130	**0.020**	0.112										
I1	.195*	.238**	**0.002**	0.152	.187*									
I2	.214*	.199*	.168*	.207*	.191*	.233**								
I3	.215*	.189*	**-0.067**	0.080	.263**	.454**	.306**							
I4	.247**	.184*	**-0.026**	.215*	.245**	.481**	.259**	.404**						
I5	.307**	0.154	**0.155**	.185*	0.150	.424**	.358**	.334**	.641**					
F1	.217**	.270**	**0.082**	0.024	0.160	.242**	.255**	.368**	.258**	.254**				
F2	.261**	.302**	**0.146**	.186*	.223**	.334**	.201*	.314**	.298**	.338**	.399**			
F3	.300**	.207*	**0.163**	.305**	.290**	.247**	.169*	.312**	.265**	.307**	.280**	.347**		
F4	.204*	.243**	**-0.043**	0.065	.190*	.199*	.301**	.263**	.181*	.295**	.514**	.443**	.403**	1

Note: * p< 0,05; * p< 0,01

Subsequently, with the solution of 13 reagents, the adequacy of the data to the EFA was analyzed using the KMO test, resulting in a satisfactory adaptation (KMO = 0.813) and the significant Bartlett sphericity test (x ^ 2 (78) = 457.432, p <0.05) with

which the EFA was approved (Pituch & Stevens, 2015; Lloret-Segura et al., 2014; Hair et al., 1999).

The primary analysis of the EFA was carried out with the solution of 13 reagents to determine the number of dimensions that made up the instrument, extraction by principal components with an orthogonal varimax rotation was used, since low to moderate relationships were observed in the correlation matrix (DeVellis, 2003; Hair et al., 1999). Four factors were obtained that explained 59% of the explained variance. However, this was dispensed with when analyzing the commonalities of the items after extraction (Table 2), in which it was detected that the CI2 reagent "Search for and reach agreements" did not present an acceptable value in relation to the factors (Pituch & Stevens, 2015). Similarly, the four-factor structure it offered was not theoretically consistent with the proposed design.

For these reasons, the item was eliminated and the second solution was chosen since it consists of three theoretically congruent dimensions with 12 sufficient items to evaluate each dimension (Table 3), while also presenting factor saturations greater than .32 (DeVellis, 2003; Lloret-Segura et al., 2014). Similarly, this solution was used for the satisfactorily explained variance greater than 0.50, as well as for the latent root analysis when observing the sedimentation graph (Hair et al., 1999) (Figure 1).

Table 2. Communalities solution 13 reagents

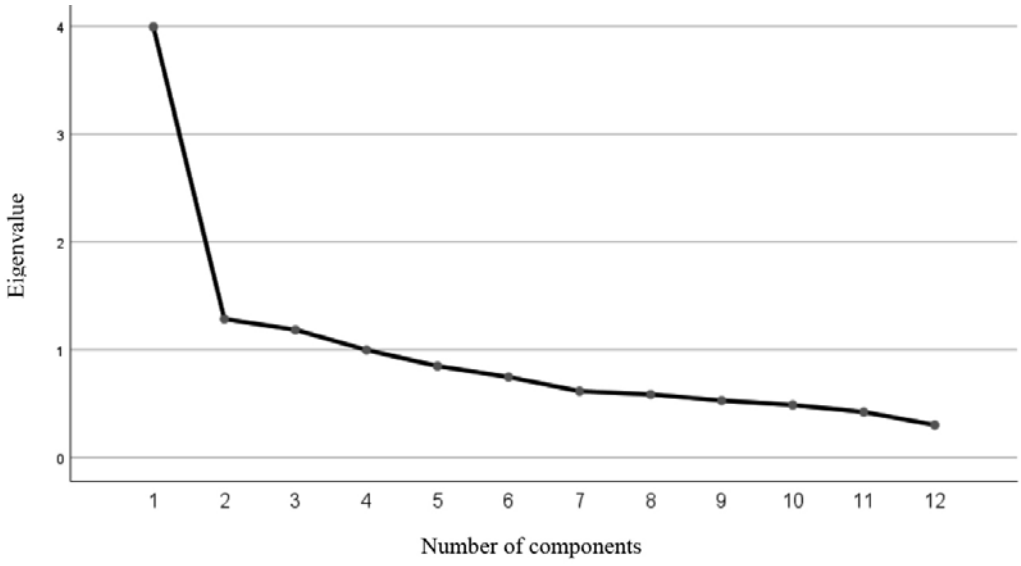
Reagent	Initial	Extraction
P1 Generation of new Ideas	1.000	0.672
P2 Adaptation to an adverse environment	1.000	0.303
P4 Confidence in capabilities	1.000	0.841
P5 Disciplined work	1.000	0.761
I1 Collaborate with others	1.000	0.580
I2 Search for and reach agreements	**1.000**	**0.288**
I3 Seeking others to work	1.000	0.525
I4 Mobilize others	1.000	0.717
I5 Organize work for others	1.000	0.645
F1 Time management	1.000	0.633
F2 Troubleshooting	1.000	0.510
F3 Decision making	1.000	0.544
F4 Project planning	1.000	0.667

Note: Extraction method: principal component analysis.

Table 3. Second solution AFE 12 reagents

KMO		0.813	
Bartlett's sphericity	X^2	420.560	
	gl	66	
	Sig.	0.001	
Component	Sums of loads squared of the rotation		
	Total	% of variance	% accumulated
1	2.332	19.436	19.436
2	2.323	19.359	38.795
3	1.809	15.079	53.873
Reagent	Rotated Component Matrix		
	1	2	3
I4	0.828		
I5	0.756		
I1	0.738		
I3	0.551		
F4		0.792	
F1		0.774	
F2		0.615	
P2		0.518	
P1			0.739
P5			0.732
F3			0.531
P4			0.525

Figure 1. Second solution sedimentation graph



Note: Latent root analysis of the second factorial solution: 12 items 3 factors.

On the other hand, the internal consistency coefficients Cronbach's Alpha (**α**) and McDonald's Omega (**α**) were calculated for the general instrument and for each dimension (Table 4). Based on the analysis, the adequate internal consistency of the instrument and its dimensions are integrated into the evidence of psychometric relevance of the CG-CE (Ventura-León & Caycho-Rodríguez, 2017).

Table 4. *CG-CE* internal consistency coefficients and competency dimensions

	Dimension 1 Interpersonal Competencies	Dimensión 2 Competencias Funcionales	Dimensión 3 Competencias Personales	CG-CE
α	0.750	0.672	0.616	0.805
ω	0.813	0.774	0.730	0.911

Subsequently, an analysis of invariance of the factorial structure was carried out between the participants who had opened some type of business and among those who had not, for this a Multigroup Structural Equation Modeling was carried out (Byrne, 2008), determining that the CG-CE instrument does not present configural, metric or structural invariance (Milfont & Fischer, 2010; Van de Schoot et al., 2012), which means that people who have opened businesses/companies and those who have not present differences in the latent variables instrument and respond differently to reagents (Table 5).

Table 5. *CG-CE* multigroup invariance test

	X^2	*df*	*p*	*CFI*	*TLI*	*RMSEA*	*AIC*
Base	43.4	48	0.66	1.0	1.01	0.000	127.429
Model 1	148.145	96	0.001	0.885	0.842	0.062	316.145
Model 2	171.966	105	0.005	0.852	0.814	0.067	321.966
Model 3	172.23	106	0.007	0.854	0.818	0.067	320.230

Note: Invariance between people with businesses and without businesses opened.

4. Conclusions and discussion

The objective of this study was to design, validate and make reliable a measurement instrument to evaluate generic competencies associated with entrepreneurship. The competency model on which the instrument was based was structured and revised in a previous study in which evidence was provided on its content validity (Quezada et al., 2021). Likewise, the design of the instrument was based on the recommendations of Demchuk et al. (2015) as well as Schelfhout et al. (2016) for the writing of performance indicators and performance levels. The authors mention that in the evaluation of competencies, the observation of performance at distinguishable levels must be taken into account. For this reason, it was decided to base the instrument on the logic of a behavioral scale (Doğan & Uluman, 2017) to distinguish these performance levels, as well as on a behavioral interview (Salgado et al., 2004) since this technique implies that the participant responds based on what he has actually executed beyond his attitudes or opinions.

This is relevant when observing that the proposals for the evaluation of generic competencies have been prepared based on the perception that one has of execution

or on the attitude towards said competence instead of the performance actually presented in the experience (Luppi et al., 2019; Hodzic, 2016). Similarly, the design and distribution of the instrument responded to the isolation conditions for health security derived from the Covid-19 pandemic, in which direct observation of the performance of the participants was not possible as suggested for the assessment of competencies (Villa & Poblete, 2007).

The first analysis performed on the instrument was an Exploratory Factor Analysis which allowed us to observe the dimensions of the instrument. In this exercise, the CP3 item "Work Proactively" was first discarded, which was contained in the personal level of competencies. This competence was extracted from the literature in relation to psychological characteristics such as "proactivity", "motivation" and "need to achieve" (Batanero & Rebollo, 2017; Bilbao & Vélez, 2015; González & Wagenaar, 2003; Mitchelmore & Rowley, 2013; Villa & Poblete, 2007). Its discard was due to the non-relationship it had with the rest of the items, except for item CP4 "Confidence in one's own actions and decisions" and with CI2 "Search for and reach agreements". This response phenomenon may be due to the redundancy of the item with those mentioned, rather than a conceptual relationship between the assumptions that evaluate the items, which should to be avoided (Pituch & Stevens, 2015; Lloret-Segura et al., 2014).

By continuing with the analysis, it was possible to identify a theoretically and statistically congruent factorial structure. This solution responds to the proposed three-dimensional structure (personal, interpersonal, and functional competencies), accommodating four questions per factor. In this solution it was observed that the item CF4 "Decision making" was grouped in the dimension of Personal Competencies, which is understandable since the literature has shown how decision making is characterized as a skill and as a process (Gustaffson, 2006).

Similarly, in the exercise, the internal consistency coefficients were also calculated to determine the reliability of the instrument. Regarding the results, it is observed that Cronbach's Alpha ranges from .67 to .80, for its part, the Omega coefficient fluctuated between .73 to .91, which is considered acceptable. The omega coefficient made it possible to avoid fluctuations in the reliability calculation due to the number of items, response options, and the variance of the instrument, considering it the "true" reliability (Ventura-León & Caycho-Rodríguez, 2017).

Finally, an invariance analysis of the factorial structure is offered using Multigroup Structural Equations, this exercise was used in order to detect the stability of the factorial structure between entrepreneurs (with open businesses) and non-entrepreneurs (without opened businesses). In this case, the evaluation consisted of contrasting three methodological hypotheses: 1) the groups conceptualize the constructs in the same way (configural invariance); 2) the groups respond to the items in the same way (metric invariance); 3) the observed scores of the groups correspond to the latent scores of the variables (scalar invariance) (Milfont & Fischer, 2010). In this sense, it was determined that the groups that open businesses and those that do not, conceptualize the competencies differently, respond to the items differently and their observed scores do not correspond to the latent score of the variable (Milfont & Fischer, 2010; Van de Schoot et al., 2012). This condition limits the interpretations that are made of the instrument's scores, since although its items present consistency and there is evidence that their dimensions are congruent with the theory, the inferences can only be of magnitude, but not of differences between groups since there is no certainty that the groups respond in a similar way to the factorial structure of the instrument (Van de Schoot et al., 2012).

However, one of the reasons why the instrument may be behaving in this way is the characterization of the groups used for the invariance analysis, since the criterion

was the opening of at least one business, which entails different conceptual problems: 1) the literature supports the entrepreneurial conception of people who do not yet have a business but who are in the process of establishing one (nascent entrepreneurs) (Wagner, 2006); 2) the literature also recognizes that entrepreneurship begins with an entrepreneurial intention, even if one is not directly involved in the tasks of opening a business (Asante & Affum-Osei, 2019; Rotefoss & Kolvereid, 2005); 3) the businesses that the group has opened range from 1 to 6, which implies that it cannot be determined that the same generic competencies are deployed and in the same magnitude. Therefore, the condition of sampling and characterization of the entrepreneur and the non-entrepreneur has to be refined in future studies to contribute to the insertion of the generic competencies of entrepreneurial behavior.

Likewise, the sample size used for the analyzes could also have played an important factor in the results, since based on Lloret-Segura et al. (2014) the classic recommendation of N/p (sample ten times greater than the number of items) or of five subjects per variable is not enough to guarantee the stability of the factorial solutions. In this case, the authors point out that a minimum sample of 200 subjects is recommended to assess the quality of an instrument, a condition that this study could not meet.

However, for practical purposes, the factorial, internal consistency, and invariance solution presented in this study contribute to the establishment of evidence of validity and reliability of the generic competencies model of entrepreneurial behavior, since it is recognized that validity does not correspond to an instrument as a quality, but rather to the inferences that we want to make from the results of that instrument (Sireci, 2007), which is the objective of this study.

Similarly, the results open the opportunity for the model to continue to be tested, and specifically for the instrument to continue working to determine whether it is possible to identify an entrepreneur and a non-entrepreneur based on their level of generic competencies. Likewise, the potential that the tool represents is recognized, since by being able to determine the distinction of entrepreneurial behavior in entrepreneurs and non-entrepreneurs through generic competencies, the model could be tested in samples that are not socially recognized as entrepreneurs, but that is hypothesized behave as such since it is considered that entrepreneurship is not just typical of opening companies or businesses for profit, but of any other activity that implies that the person works modifying their environment to obtain a specific achievement (Hjorth & Holt, 2016; Holley & Watson, 2017; Huyghe et al., 2016; Obschonka et al., 2019; Pertuz et al., 2021).

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The impact of collaboration networks on technological innovation in firms

El impacto de redes de colaboración en la innovación tecnológica en empresas

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Abstract

Latin American manufacturing firms must develop innovations to be competitive. For this reason, this research has two objectives: first, to analyze how connections with customers, suppliers, competitors, and research institutes are related to absorptive capacity, and, second, to demonstrate the existing relationship between absorptive capacity and technological innovation. A theoretical model was developed to show the relationship among the variables. The structural equation modelling was applied through AMOS software to a sample of 1,098 Peruvian manufacturing firms that participated in the second national innovation survey carried out in 2015. This study contributes to the literature on how firms relate with collaboration networks to improve their innovation capacity. In this way, firms obtain knowledge by applying the inbound open innovation approach. This knowledge is processed through each firm's absorptive capacity and will improve its innovation capacity.

Low or medium-low tech manufacturing firms that make investments in machinery, hardware, and software are more able to carry out product and process innovations. Product innovations allow firms to maintain or increase their position in the market and have more satisfied customers, while process innovations reduce their operating costs and make them more efficient.

Resumen

Las empresas manufactureras latinoamericanas deben desarrollar innovaciones para ser competitivas. Por ello, esta investigación tiene dos objetivos: primero, analizar cómo se relacionan las conexiones con clientes, proveedores, competidores e institutos de investigación con la capacidad de absorción, y, segundo, demostrar la relación existente entre la capacidad de absorción y la innovación tecnológica. Se desarrolló un modelo teórico para mostrar la relación entre las variables, a las cuales se les aplicó el método de ecuaciones estructurales, utilizando el software AMOS, a una muestra de 1098 empresas manufactureras peruanas que participaron en la segunda encuesta nacional de innovación realizada en 2015. Este estudio contribuye a la literatura sobre cómo las empresas se relacionan con las redes de colaboración para mejorar la capacidad de innovación, de esta manera obtienen conocimiento aplicando el enfoque de innovación abierta entrante, este conocimiento procesado a través de la capacidad de absorción de la empresa mejorará su capacidad de innovación. Las empresas manufactureras de intensidad tecnológica baja o media-baja realizan inversiones en maquinaria, hardware y software y tienen más capacidad para realizar innovaciones de productos y procesos. Las innovaciones en producto permiten a las empresas mantener o incrementar su posición en el mercado o tener clientes más satisfechos, al tiempo que realizan innovaciones en los procesos para reducir sus costos operativos o ser más eficientes.

Keywords | palabras clave

Networks, collaboration, capacity, absorption, innovation, emerging, manufacturing, model.
Redes, colaboración, capacidad, absorción, innovación, emergentes, manufactura, modelo.

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1. Introduction

Innovation is a topic that has captured the attention of scholars and managers. Through developing innovation capability, firms are able to become more competitive (Coccia, 2017), reach higher levels of exportation (Love & Roper, 2015), and introduce products and services to the market that satisfy the demands of their customers (King & Baatartogtokh, 2015). In this sense, firms seek partners with whom they can connect and, in this way, improve their innovation capability (Scuotto et al., 2017).

Because connections with business associates like customers, suppliers, competitors, universities, or industry associations help firms to develop innovations (Lai, Hsu, Lin, Chen, & Lin, 2014) and because of the benefits that a firm with this capability can generate, it is necessary to carry out studies that show how connections with key associates are related to absorptive capacity, which is a dynamic capability (Eisenhardt & Martin, 2000) useful for firms that wish to compile knowledge from other sources in order to make their level of technological innovation capability stronger.

Collaboration networks have captured the attention of policymakers because the firms that are able to create the most connections through collaboration networks are also more able to develop their innovation capability (Marrocu et al., 2013). However, at the same time, managers recognize that connections with customers provide ideas for new products, just as connections with suppliers and universities provide knowledge to develop technological innovations and connections with competitors provide ideas and the motivation to keep innovating (Baker et al., 2016).

On the other hand, Cohen and Levinthal (1990, p.128) specify that "absorptive capacity is the ability of a firm to recognize the value of new, external information, assimilate it, and apply it" to strengthen its technological innovation capability. Indeed, abundant studies show how technological innovation evolves more readily in the presence of absorptive capacity (Martín-de Castro, 2015), but also it is important to mention that these studies focus on high-tech firms (Tzokas et al., 2015), that is to say, those firms that dedicate important financial resources to carrying out research and development in developed economies. These studies largely ignore firms in emerging economies that, despite not dedicating large quantities of resources to research and development, also carry out technological innovations, investing in the purchase of machinery, hardware, and software (Goedhuys et al., 2014).

The literature to review is abundant when the phenomenon being studied is the innovation capability of firms with a higher technological intensity in developed economies (Conte & Vivarelli, 2014). Nonetheless, fewer studies have focused on emerging economies and the low-tech and medium-low tech firms in them; indeed, not many researchers have focused on the Latin American region (Del Carpio & Miralles, 2018; Ponce-Espinosa et al., 2017; Zapata-Rotundo & Hernández-Arias, 2018; Romero et al., 2021). However, the lower-tech manufacturing firms in these countries pour great effort into developing innovation capability, which contributes to their being more competitive on the global market.

The present study poses the following research question: What factors influence the innovation capability of low-tech firms in emerging economies? Its specific objectives are the following: first, to analyze how connections with customers, suppliers, competitors, and research institutes are related to absorptive capacity (Nicotra et al., 2014), and, second, to demonstrate the existing relationship between absorptive capacity and technological innovation (Del Carpio & Miralles, 2018). The information used in this research corresponds to the second innovation survey of the manufacturing

industry carried out in Peru in 2015. The unit of analysis is the low-tech or medium-low tech manufacturing firm that participated in said survey.

The structure of the study is as follows: after this introduction, the theoretical framework is presented, and the hypotheses are formulated. The third section explains the methodology, describes the data, defines the study variables, and explains the statistical procedures used to analyze the data. The fourth section shows the results, and then the fifth section presents the discussion of the results. Finally, the conclusions, study limitations, and future lines of research are presented.

1.1. Theoretical framework and the formulation of the hypotheses

This study is carried out under the theory of dynamic capabilities, which are "a set of specific and identifiable processes such as product development, strategic decision making, and alliancing" (Eisenhardt & Martin, 2000, p. 1105). It is important to note that "the dynamic capabilities approach has been built on Schumpeter's ideas" (Breznik & Hisrich, 2014, p.374).

1.1.1. Collaboration networks and absorptive capacity

Collaboration networks have been linked to the development of manufacturing firms' absorptive capacity (Agramunt, Berbel-Pineda, Capobianco-Uriarte, & Casado-Belmonte, 2020). Tsai (2001) makes this observation in his study on food producers, finding a link between these firms' position in their respective collaboration networks and their level of absorptive capacity. Also, Spithoven, Clarysse, and Knockaert (2010) indicate that firms that belong to mature industries develop absorptive capacity to implement so-called "inbound open innovation activities"; that is to say, they interact with customers, suppliers, and other actors so that these actors will provide them with the information needed to improve their innovation capability. On the other hand, Cantner and Joel (2011) indicate that interaction with different actors belonging to collaboration networks leads to the generation of knowledge that, with the help of absorptive capacity, leads to the firm's improved innovation capability. Along these lines, Hurmelinna-Laukkanen et al. (2012) argue that absorptive capacity and the stability of collaborative networks help firms to improve their innovation capability. The relationships in these collaborative networks can be formal, through the signing of contracts, or informal, based on participants' mutual trust, as what they seek is to share knowledge.

Also, it is important to point out that Najafi-Tavani et al. (2013) observed a link between absorptive capacity, product innovation developments, and suppliers' involvement. Two of the factors that depend on the involvement of the suppliers are the sharing of technical information and the suggestions that suppliers can provide in the first stages of the development of new products. Furthermore, Saenz et al. (2014) mention the crucial way the supplier-buyer relationship is affected by absorptive capacity. Managers do not just want to be careful in the selection of their suppliers; they should also develop absorptive capacity to improve their innovation capability. It is also important to mention that Scuotto et al. (2017) found that when firms have higher levels of absorptive capacity, their interaction with collaborative networks increases their innovation capability as a result.

These arguments have allowed for the formulation of the following hypothesis:

H1: Collaboration networks are related to absorptive capacity in low-tech and medium-low tech firms.

1.1.2. Absorptive capacity and product innovation

Absorptive capacity allows firms to improve their innovation capability with regard to their products (Coronado-Medina et al. 2020). Murovec and Prodan (2008) analyzed the strong relationship between Slovenian firms' absorptive capacity and their ability to develop product innovations. Moreover, Zhou and Wu (2010) indicate that firms interact with their customers, suppliers, competitors, and others to obtain information to be processed through absorptive capacity and, in this way, to carry out product innovations. Also, Huang and Rice (2012) argue that absorptive capacity is an indispensable requisite for firms that wish to carry out product innovations.

On the other hand, Ritala and Hurmelinna–Laukkanen (2013) focus on the collaboration between firms and their competitors, highlighting the role of absorptive capacity in assimilating knowledge and converting it into product innovations, as well as its role in protecting firms' innovations so they are not imitated by competitors. It is important to mention that, in addition, Moilanen et al. (2014) analyzed the mediating role of absorptive capacity between the flows of knowledge that come from the interaction of firms with their collaborative networks and their innovation performance. Martinez-Senra et al. (2015) empirically verified that firms that face a solid appropriability regime, that is to say, firms that can protect their intellectual property, are more able to develop product innovations despite having a low level of absorptive capacity.

Thus, the following hypothesis is formulated:

H2: Absorptive capacity is related to product innovation in low-tech and medium-low tech firms.

1.1.3. Absorptive capacity and process innovation

Absorptive capacity is related to process innovation capability (Aliasghar et al., 2020), and, in this sense, Murovec and Prodan (2008) analyzed the strong relationship that exists between Slovenian firms' absorptive capacity and their ability to develop process innovations. Also, Segarra-Blasco and Arauzo-Carod (2008) indicate that Spanish firms present low levels of absorptive capacity and thus seek out agreements with universities and research centers to improve their ability to develop process innovations. Hervas-Oliver et al. (2016) believe that firms are more likely to develop process innovations when they have higher levels of absorptive capacity and organizational innovation capability.

Finally, Jespersen et al. (2018) demonstrated how it is more likely for process innovations to be developed by firms able to synthesize their associates' knowledge. Bayona-Saez et al. (2017) found that absorptive capacity is more determinant of product innovation than of process innovation. Additionally, Del Carpio and Miralles (2018), analyzing low-tech Peruvian manufacturing firms, identified a link between technological innovation, that is to say, product and process innovation, and absorptive capacity.

Based on the aforementioned, the third hypothesis is formulated:

H3: Absorptive capacity is related to process innovation in low-tech and medium-low tech firms.

1.1.4. Technological acquisition and product innovation

Various studies indicate that technological acquisition, that is, firms' acquisition of software, hardware, and machinery, helps increase firms' innovation capability (Frigon et al., 2020). Along these same lines, Conte and Vivarelli (2014) analyzed the data from an innovation survey of more than 3,000 Italian firms and found that the acquisition of machinery had a positive relationship with process innovation but not with product innovation. Also, Filippetti (2011), using data from the European sur-

vey Innobarometer 2009, found that firms that focused on cost reduction and were, in general, low-tech or medium-low tech firms were more likely to develop product innovations. On the other hand, Goedhuys and Veugelers (2012) showed that Brazilian firms improved their technological capability through the acquisition of machinery and equipment that helped them carry out product and process innovations.

Along these lines, Pellegrino et al. (2012), using the database of the third communitarian innovation survey of Italian industry, found that the acquisition of machinery, software, and hardware has a positive relationship with product innovation for young firms but not for mature firms. Even more importantly, Liao and Barnes (2015) found that information from machinery and equipment suppliers made product innovation capability more flexible for firms that had fewer than 250 employees. However, Frank, Cortimiglia et al. (2016) indicate that even when investment in machinery acquisition is one of the innovation activities most frequently carried out by Brazilian firms, this activity is not reflected in their innovation results.

According to what is mentioned above, the fourth hypothesis is formulated:

H4: The acquisition of machinery, hardware, and software is related to product innovation in low-tech and medium-low tech firms.

1.1.5. Technological acquisition and process innovation

Technological acquisition and its relationship with process innovation have been analyzed in different circumstances (Murmura et al., 2021). Also, Reichstein and Salter (2006) analyzed an innovation survey of English firms and found that process innovation is related to the incorporation of new machinery. Rouvinen (2002), analyzing information from a Finnish innovation survey, found that acquisition of machinery and connections with machinery suppliers facilitated process innovation. Also, Vaona and Pianta (2008), analyzing the second communitarian innovation survey of the manufacturing industry in eight European countries, found that the acquisition of machinery, hardware, and software has a positive relationship with process innovation, independent of firm size.

Several years later, Piening and Salge (2015), analyzing German industry, found that low-tech firms, through the purchase of machinery, hardware, and software, acquire knowledge that helped them develop process innovations. In the same way, Hervas-Oliver et al. (2016), analyzing the 2006 Spanish communitarian innovation survey, found that firms that carry out process innovations also carry out acquisitions of machinery, hardware, and software. Also, Martino et a. (2017) analyzed firms in the Italian olive oil industry and found that those firms that carried out investments in machinery, hardware, and software were better able to carry out process innovations.

According to these findings, the fifth hypothesis is formulated:

H5: The acquisition of machinery, hardware, and software is related to process innovation in low-tech and medium-low tech firms.

1.1.6. Process innovation and product innovation

Process innovation and its impact on product innovation in the manufacturing industry have been analyzed several times in the past. For example, Gunday et al. (2011) researched 184 Turkish manufacturing firms and found that the greater the levels of process innovations, the greater the levels of product innovations. In the same way, Hassan et al. (2013) found that process innovation has a positive relationship with product innovation. Also, Roldan and Bastos (2019), who studied more than 230 technology-oriented firms in Brazil, identified that product innovation and process innovation are related.

Additionally, Camisón and Villar-López (2014) found that process innovation reduces costs and changes the way new products are generated, which favors product innovation. Ballot, Fakhfakh et al. (2015), analyzing the data from the fourth communitarian innovation survey, which included French and English firms, found complementarity between process and product innovation, as the introduction of new products also demands changes in production processes. Also, Doran (2012) conducted a literature review on the complementarity between process and product innovation and found that many authors did consider them complementary; that is to say, these authors believed that process innovation leads to product innovation and vice versa.

Based on the aforementioned, the sixth hypothesis is formulated:

H6: Process innovation is related to process innovation in low-tech and medium-low tech firms.

1.1.7. The mediating role of absorptive capacity on the relationship between collaboration networks and technological innovation

The mediating role of absorptive capacity has motivated many studies, including research by Tsai (2001), who found that the interaction between absorptive capacity and collaboration networks favored the development of firms' innovation capability. Along these same lines, Grimpe and Sofka (2009) argue that absorptive capacity contributes to the improvement of firms' innovation performance if they are able to connect with customers and competitors, which gives them access to market information, or with suppliers and universities, which provides them with technology-related information. Also, Liao et al. (2010) mention that the relationship between innovation capability and knowledge acquisition is mediated by absorptive capacity. Moreover, they indicate that acquiring knowledge can be facilitated through relationships with suppliers, customers, universities, and even competitors.

On the other hand, Kostopoulos et al. (2011), interested in how absorptive capacity mediates innovation performance and the flow of knowledge, highlighted that the flow of knowledge is the result of interaction with agents outside of the firm. Moreover, Moilanen et al. (2014) analyzed small firms that invest little to nothing into research and development and found that their absorptive capacity fulfilled a complete mediating role in the relationship between the flow of knowledge and those firms' innovation performance.

Because of this, the following hypothesis is proposed:

H7a: Absorptive capacity mediates the relationship between collaboration networks and product innovation.

H7b: Absorptive capacity mediates the relationship between collaboration networks and process innovation.

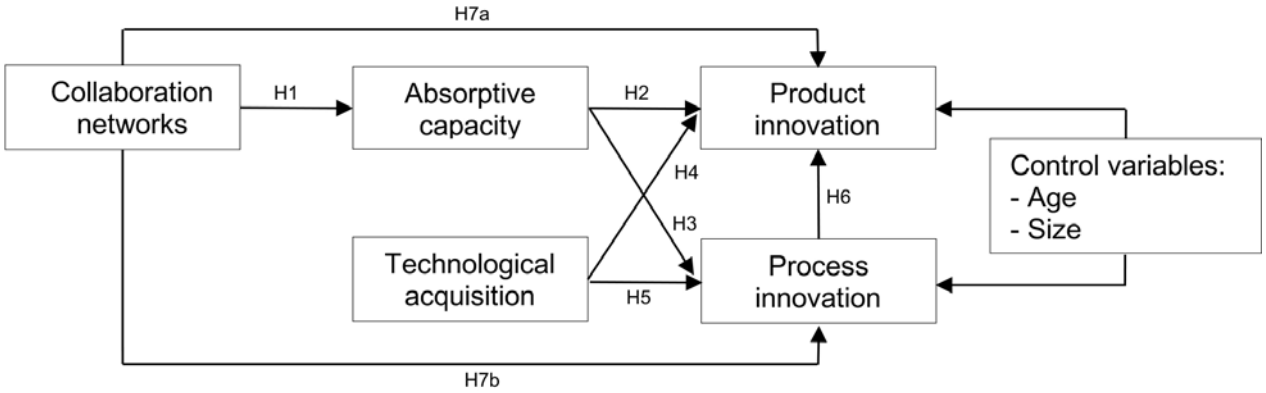
2. Methodology

2.1. Data

For this research, data from the 2015 National Innovation Survey in the Manufacturing Industry were used. The data collection took place during the reference period of 2012-2014; the representative sample was of 1,452 large, medium, and small firms; however, for the purposes of this study, only 1,098 low-tech and medium-low tech manufacturing firms are considered due to the fact that Peru, as an emerging country, has a higher percentage of low-tech and medium-low tech firms.

To analyze the research model in Figure 1, a structural equations model was used to evaluate the hypotheses.

Figure 1. Proposed model



Source: The authors.

2.2. Measurement of the variables

2.2.1. Dependent variables

Product innovation

Product innovation is the result of the dichotomous responses to the following questions: was the firm able to introduce the following to the market: a new good, a new service, a significantly improved good, or a significantly improved service (Gronum, 2012)?

Process innovation

Process innovation is the result of the dichotomous responses to the following questions: was the firm able to introduce the following: a new means of production of goods or provision of services; a new method for logistics, distribution, or dispatch of inputs, goods, or services; a new production support activity, such as maintenance or procurement systems, accounting, or IT; a significantly improved method of production of goods or provision of services; a significantly improved method for logistics, distribution, or dispatch of inputs, goods, or services; a significantly improved production support activity, such as maintenance or procurement systems, accounting, or computing (Gronum, 2012)?

2.2.2. Independent variables

Collaboration networks

According to Nieto and Santamaría (2007), collaboration networks are measured by how they connect the firm with the following agents or institutions: (1) universities, (2) suppliers, (3) customers, (4) competitors, (5) industry associations, and (6) consultants. The variables are dichotomous (YES or NO), according to these actors' connection with the firm.

Absorptive capacity

Absorptive capacity is measured taking Escribano, Fosfuri, and Tribó's (2009) proposals into account. In this sense, three variables are proposed: (1) internal technological research and development expenses, (2) expenses related to training for innova-

tion activities, and (3) if the firm has a Research & Development department. All of the variables are dichotomous (YES or NO).

Technological acquisition

Technological acquisition is measured according to the proposals of Escribano et al. (2009). Three variables are defined: (1) capital assets purchases, (2) hardware purchases, and (3) software purchases. All of the variables have a logarithmic transformation.

2.2.3. Control variables

The size of the firm is a variable measured by the logarithm of the total number of employees, according to Caloghirou et al. (2004) and Schoenmakers and Duysters (2006), and the age of the firm is measured as the number of years (expressed as a logarithm) from its founding up to present.

Statistical method

AMOS version 27 software was used to carry out the two-step structural equation of covariance to create an estimation model, according to Medrano and Muñoz-Navarro (2017). First, the measurement model was estimated when the relationship between the indicators and the latent construct was determined by Confirmatory Factor Analysis (CFA). Secondly, the estimation of the structural model was performed, in which the relationships between the constructs were obtained using the coefficients and the level of statistical significance.

3. Results

3.1. Measurement model

The research data were analyzed and presented using reliability and convergence indicators. In terms of reliability, the measured composite reliability (CR) values are greater than 0.7, and all of them have average variance extracted (AVE) values greater than 0.5. With regard to multicollinearity, the variance inflation factor (VIF) is controlled, with levels of less than 5. Based on the results of the indicators in Table 1, it was possible to carry out the structural model. Moreover, all of the R^2 values were accepted in the endogenous variables, which indicates the good effect of the model of the low-tech firms. Finally, Table 2 reveals that all of the variables achieve discriminant validity, taking the Fornell-Larcker Criterion (1981) into account.

Table 1. Indicators of reliability and validity

Latent variable	CR	AVE	VIF	R^2
Collaboration networks	0.847	0.535	1.082	
Absorptive capacity	0.792	0.574	1.307	0.520
Technological acquisition	0.826	0.616	1.291	
Product innovation	0.860	0.633		0.230
Process innovation	0.882	0.561		0.434
Referential values	>0.7	>0.5	<5	

CR, Composite reliability; AVE, Average variance extracted; VIF, Variance inflation factor.
Source: SPSS and AMOS software.

Table 2. Discriminant validity

	Collaboration networks	Absorptive capacity	Technological acquisition	Product innovation n	Process innovation n
Collaboration networks	**0.731**				
Absorptive capacity	0.089	**0.757**			
Technological acquisition	0.094	0.473	**0.785**		
Product innovation	0.091	0.377	0.297	**0.796**	
Process innovation	0.097	0.368	0.324	0.332	**0.749**

Notes: Fornell-Larcker Criterion: the diagonal values (bold) are the square root of the shared variance between the constructs and their measurements (AVE). For discriminant validity, the square root of the AVE (bold) is greater than the correlations between the other latent variables.

Source: AMOS software.

3.2. Structural model

After verifying the measurement models, the structural model was estimated. Table 3 presents the coefficients and p-values of the research model.

Table 3. Results of the structural model

Hypothesis	Relation	Path coefficient	p-value
H1	CN -> ACAP	0.721***	0.001
H2	ACAP -> ProdI	0.461***	0.001
H3	ACAP -> ProcI	0.251***	0.001
H4	TECH -> ProdI	0.201 *	0.060
H5	TECH ->ProcI	0.251***	0.001
H6	ProcI ->ProdI	0.695***	0.001

CN=Collaboration networks; ACAP=Absorptive capacity; TECH=Technological acquisition; ProdI= Product innovation; ProcI=Process innovation.
Note: n.s. = insignificant; * p ≤ 0.1; ** p ≤ 0.05, *** p ≤ 0.01, **** p ≤ 0.001.
Source: AMOS software.

The control variables are shown in Tables 4 and 5.
Las variables de control se muestran en las Tables 4 y 5.

Table 4. Control variables for product innovation

	Coef.	p-val
Firm size	-0.137	0.006
Firm age	0.050	0.258

Source: AMOS software.

Table 5. Control variables for process innovation

	Coef.	p-val
Firm size	-0.085	0.030
Firm age	-0.045	0.194

Source: AMOS software.

It can be observed that there is a small, negative, statistically significant relationship between firm size and innovation. In other words, small firms are more likely to innovate. These results coincide with Lin et al. (2019), who point out that small firms are better able to develop innovations because they are more flexible and independent.

The model also complies with the goodness of fit index, according to the following indicators: CMIN / df, GFI, TLI, CFI, and RMSEA. The values obtained show the adequate fit of the research model. See Table 6 (Singla et al., 2018).

Table 6. Model fit summary

Indicators	Structural Model
CMIN/DF	1.967
CFI	0.962
NFI	0.927
RFI	0.903
TLI	0.950
IFI	0.963
RMSEA	0.030

Source: AMOS software.

3.3. Analysis of the mediation

When absorptive capacity was analyzed, certain steps were taken to confirm if it was a mediating variable and what type of effect it had. Hair et al. (2014) demonstrate that mediation is present when a mediating variable is able to somewhat absorb whatever effects an exogenous construct (in the case of independent variables) or endogenous construct (in the case of dependent variables) might have. The variance accounted for (VAF) determines to what degree the process of mediation explains the variance of the dependent variable. If the VAF is under 20 %, it can be concluded that there is no mediation, and a VAF that is greater than 20 % and less than 80 % would indicate partial mediation (Hair, Hult, Ringle, & Sarstedt, 2016). A VAF of over 80 % indicates complete mediation. The VAF is the relationship between the indirect effect (0.191) and the total effect (0.306) for the absorptive capacity between collaboration networks and product innovation and the relationship between the indirect effect (0.119) and the total effect (0.296) for the absorptive capacity between collaboration networks and process innovation, obtaining 62 % and 40 %, respectively. Therefore, the partial mediation of absorptive capacity is present for both relationships.

Table 7. Mediation test

Hypothesis	Influence	Direct Effect	Efecto indirecto (valor p)	Efecto total	VC (%)	Interpretación
H7a	**CN>ACAP> ProdI**	0.115** (0.014)	0.191** (0.014)	0.306** (0.014)	62 %	Mediación parcial
H7b	**CN>ACAP> ProcI**	VAF (%)	Interpretation	0.296*** (0.001)	40 %	Mediación parcial

Note: VAF = Variance Accounted For; n.s. = insignificant; * p ≤ 0.1; ** p ≤ 0.05, *** p ≤ 0.01, **** p ≤ 0.001 significant. VAF > 80% indicates total mediation, 20% ≤ VAF ≤ 80% indicates partial mediation, and VAF < 20% indicates that there is no mediation.
Source: SMART PLS software, the authors' calculations.

4. Discussion and conclusions

This study contributes to the literature on innovation that establishes that firms that are linked to collaboration networks obtain knowledge through them by applying the inbound open innovation approach; this knowledge, processed through the firm's absorptive capacity, will improve its innovation capacity. The results show that collaboration networks are related to absorptive capacity in low-tech and medium-low tech firms; the results obtained coincide with those of Tsai (2001) and Hurmelinna-Laukkanen et al. (2012).

The literature recognizes that absorptive capacity is one of the determinants of product innovation. The identification of external information and its assimilation process achieved through absorptive capacity allow the firm to be better able to introduce new products to the market, adapting to the demands of its customers. This result coincides with the findings of Murovec and Prodan (2008) and Martinez-Senra et al. (2015), who found that firms with higher levels of absorptive capacity are more able to develop product innovations.

Many studies find that firms develop innovations in process through the acquisition of machinery and equipment, but it is also necessary to mention that the development of absorptive capacity will allow the firm to assimilate external knowledge that comes from suppliers, consultants, universities, and research centers, which will make the firm develop its innovation capacity, and, therefore, process innovations. These results agree with those obtained by Murovec and Prodan (2008) and Del Carpio and Miralles (2018), who found that firms that develop absorptive capacity are more able to implement process innovations.

Low or medium-low tech manufacturing firms that make investments in machinery, hardware, and software are more able to carry out product innovations, even though to a great extent these technological acquisitions lead firms to carry out process innovations and even though the implementation of process innovation favors product innovations. The results obtained coincide with those of Vaona and Pianta (2008), Goedhuys and Veugelers (2012), and Pellegrino et al. (2012). In other words, there is a positive relationship between the acquisition of machinery, hardware, and software and product and process innovations.

Likewise, low and medium-low technological intensity firms make product innovations in order to maintain or increase their position in the market or have more satisfied customers, while they make process innovations to reduce their operating costs or be more efficient, which allows these firms be better able to develop product innovations. These results agree with those obtained by Gunday et al. (2011) and Roldan and Bastos (2019).

Regarding the mediating role of absorptive capacity on the relationship between collaboration networks and technological innovation, in the present study, absorptive capacity partially mediates product innovation; however, this partial mediation is at high levels close to total mediation, which coincides with the findings of Tsai (2001) and Kostopoulos et al. (2011). The exception is that in these studies, the dependent variable is innovation capability. Meanwhile, in the case of process innovation, the mediating role of absorptive capacity is only partial.

As for the control variables, the size of the firm has a negative, statistically significant relationship with product innovation. This result seems to contradict Tsai (2001), who found that large firms have more resources to carry out more innovations, but, on the other hand, agrees with Laforet (2008), who indicates that small, lower-tech firms are more creative when introducing new products onto the market.

It has been empirically verified that low-tech manufacturing firms that participated in the innovation survey in 2015 and connected with market networks were more likely to develop product and process innovations. As firms connected with institutional networks, they were more likely to develop process innovations.

This research has contributed to the literature on technological innovation carried out by low-tech and medium-low tech firms in an emerging economy—in this case, Peru—by analyzing how these firms connect with market and institutional networks to be able to develop technological innovations.

The results of the present study allow for the identification of some practical implications. The managers of low-tech firms should strengthen connections with customers, suppliers, and competitors and, at the same time, with universities and research institutes with the intention of developing a greater number of technological innovations.

The present study is not exempt from limitations, which are as follows.

The first limitation refers to how this study has used the database that was obtained from the national innovation survey of the manufacturing industry in Peru from the year 2015. As a cross-sectional study, it faces two problems: the bias generated by the fact that a single person at the firm responded to the questionnaires and the fact that this type of study does not allow a causal relationship to be established between constructs (Rindfleisch et al., 2008). It is suggested that longitudinal studies be carried out. Another option would be comparative studies using the innovation surveys carried out in other Latin American countries.

The second limitation has to do with how the constructs of market and institutional networks have been measured; these constructs reflect connections to customers, suppliers, or competitors and public or private research institutes. It is suggested that studies be carried out that identify specific connections, for example, connections with customers, suppliers, or universities, and how these relationships individually favor the development of product or process innovations.

Declaration of conflicting interests

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Relationship between the female management profile, market orientation and organizational performance. Validation of a measuring instrument

Relación entre el perfil directivo femenino, la orientación al mercado y el rendimiento de la organización. Validación de un instrumento de medición

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Abstract

The management profile with a gender perspective has been studied considering the sociodemographic characteristics of women, analyzing the competences and abilities or from an entrepreneurial orientation approach; however, few studies have delved into the explanation of constructs that condition the female managerial profile, such as human capital and social capital. Even less is explained the relationship of this profile with variables such as market orientation and organizational performance. For this reason, this paper aims to demonstrate the results of the development and validation of an instrument for measuring the relationship of three variables. For this purpose, a quantitative methodology was used, through a non-experimental design, a census of 190 female managers was carried out in hotel companies in the cities of Sucre and Potosí in southern Bolivia. A Likert scale survey was applied with 41 items; the data were processed through an exploratory factor analysis and a reliability analysis in SPSS version 22 software. The results obtained demonstrated the theoretical and empirical validity of the instrument; In this way, an adequate instrument was obtained to get information on the three variables and the relationship between the female management profile, market orientation and organizational performance was validated.

Resumen

El perfil directivo con enfoque de género ha sido estudiado tomando en cuenta las características sociodemográficas de las mujeres, analizando las competencias y habilidades o desde un enfoque de orientación emprendedora; sin embargo escasos estudios han profundizado en la explicación de constructos que condicionan el perfil directivo femenino como son el capital humano y el capital social; menos aún se explica la relación de este perfil con variables como la orientación al mercado y el desempeño organizacional. Por ello el objetivo de este artículo es desarrollar y validar un instrumento de medición que explique la relación entre estas tres variables. Con este fin se usaron métodos cuantitativos a través de un estudio no experimental, se aplicó una encuesta de escala Likert con 41 reactivos a 190 mujeres gerentes y/o propietarias de la industria hotelera en las ciudades de Sucre y Potosí en el sur de Bolivia; los datos fueron procesados a través de un análisis factorial exploratorio y un análisis de fiabilidad en software SPSS versión 22. Los resultados obtenidos demostraron la validez teórica y empírica del instrumento; así se obtuvo un instrumento adecuado para obtener información sobre las tres variables y se validó la relación entre el perfil directivo femenino, la orientación al mercado y el desempeño organizacional.

Keywords | palabras clave

Gender, management profile, validation, instrument, relationship, market orientation, organizational performance, factor analysis.
Género, perfil directivo, validación, instrumento, relación, orientación al mercado, desempeño organizacional, análisis factorial.

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1. Introduction

Few studies deal with the managerial profile with a gender perspective, some studies give priority attention to the sociodemographic characteristics of women (Morales, 2011; Matteo, 2012), in other investigations, the profile is analyzed based on the innate competencies and those acquired (Echeverri, 2015; Torrejón, 2016) it is also suggested that the managerial profile depends on internal and external conditions faced by women who develop their companies (Álvarez et al., 2017). Other authors point out that it is conditioned by the entrepreneurial orientation and that to achieve success in entrepreneurship it is important to strengthen managerial training in women. (Veciana et al., 2005; Sánchez et al., 2021).

Managers shape the market orientation and therefore this profile affects the company's performance. In this sense, the relationship between market orientation and the profile of female managers is direct (Behrens & Patzelt, 2016; Berkhout et al., 2016). Market orientation is considered a complementary asset that contributes to improving company performance (Flores et al., 2016; Lomberg et al., 2017; McKelvie et al., 2018). But in addition, the profile of managers has a direct and positive relationship with organizational performance (Alsos & Ljunggren, 2017; Baù et al., 2017).

This study aims to validate an instrument for measuring the relationship of the three variables: the female managerial profile, market orientation, and organizational performance. For this purpose, a statistical validation of an instrument applied to female managers in the hotel industry was carried out in two heritage cities in southern Bolivia.

The article begins with the definition of each of the analyzed variables and the description of their respective dimensions. This work is divided thusly: first, the Information on previous theoretical studies that support the studied relationships is briefly shown; then the methodological strategy, the results of the study, the discussion, and finally the conclusions are presented.

1.1. Female manager profile

Human and social capital influence the female managerial profile since they contribute to the achievement of autonomy and independence of women (Veciana et al., 2005; Lojpur et al., 2015; Bizri, 2017; Orlandini, 2020) and contribute towards organizational performance. Other studies such as that of Medina et al. (2021) state that there are no positive effects on organizational results if the use of practice configurations in human capital management is considered, those statements are based on the Lepak and Snell model.

In this study, the management of human capital is not considered, but rather its development by female managers. In this sense, authors such as Alsos and Ljunggren (2017) point out that there is a gender gap in the use of these capitals: women have a greater aversion to risk, make intensive use of social capital and develop their human capital less.

Human capital is understood as the general and specific experience that is stored and can be used according to the degree of instruction (Morales & Pineda, 2015; Huggins et al., 2017; Lu & Herremans, 2019). The measurement scale used for human capital is based on the studies of Millán et al. (2014). As human capital is acquired, it is important to take learning into account in its analysis. This is understood as the set of strategies used to update or improve both the general and specific experience (Arias et al., 2014). The measurement scale used to measure learning is from Gómez et al. (2015).

Social capital is considered an asset that, together with physical, human, and natural capital, contribute to sustainable economic development (Aedo et al., 2020). From the point of view of the company, social capital is considered a network of relationships that benefit the development of organizations (Ventura & Quero, 2012; Aldana & Bernal, 2019). Its influence on the female managerial profile has to do with the family role and the administration of the home due to the burden that the care of children represents for women, which is known as binding social capital, and with the development of alliances and networks that motivate and encourage the development of organizations led by women, the so-called social capital that builds bridges (Liñán & Santos, 2006; De la Mora et al., 2020).

For the measurement of social capital, the combination of two scales has been considered; one used by Liñan and Santos (2006) and the other scale developed by Kantis et al. (2001), adjustments have been made in relation to the context of the object of study.

1.2. Market orientation

The studies by Narver and Slater (1990), on the one hand, and Jaworski and Kohli (1993), on the other, are considered the first to define market orientation. Since the 1990s, it has been a new form of organizational development through which strategies are geared towards satisfying the needs and tastes of customers. According to Jaworski and Kohli (1993), the market orientation paradigm is based on the assumption that firms win and sustain a competitive advantage if they are aware of the changing needs of the market. Its definition is made up of three constructs: customer orientation, competitor orientation, and cross-functional coordination.

The study of the relationship between the female managerial profile and market orientation is scarce. There are three relationship approaches, the first dating from the 80s affirm that management requires a profile with the intention of responding to the needs of consumers as a precedent for the company to be market-oriented (Hambrick & Mason, 1984; Webster, 1988). The second approach explains that market orientation requires a profile with a lower degree of risk aversion in the face of changes in consumer needs (Narver & Slater, 1990; Jaworski & Kohli, 1993).

A third approach is the one that studies the actions of the company based on a profile that uses the experiences obtained from previous actions. The perceptions that management has about the importance of certain factors that generate sustainable advantages are determinants of the degree of market orientation (Bucktowar et al., 2015; Berkhout et al., 2016; Behrens & Patzelt, 2016). The three approaches discussed above show a positive relationship between the managerial profile and market orientation.

For the measurement of market orientation, there are two already validated scales: 1) Narver and Slater (1990), which is known as MKTOR and measures the degree of consumer orientation, the degree of ability to relate to the market and its capacity fotr innovation and 2) The measurement scale of Kohli and Jaworski (1990) called MARKOR based on a behavioral approach, which measures the generation of intelligence or information, the dissemination of information and the response capacity of the organization. In the case of this study, an appropriate combination of both scales is used.

1.3. Organizational performance

Organizational performance is understood as the financial growth of companies measured through indicators such as return on investment, assets, and period earnings; can be defined taking into account the volume of sales and market share (Bucktowar et al., 2015; McKelvie et al., 2018; Medina et al., 2021) is also measured through the

perception of the manager on comprehensive growth of the company (Ospina & Pérez, 2013; Ynzunza & Izar, 2013; Flores et al., 2016).

Studies on the relationship between organizational performance and the female managerial profile are divided into two groups: those that take into account the profile based on entrepreneurial orientation in a generic way and those that specifically take into account women as managers or owners of companies.

The former takes into account the concept of entrepreneurial orientation understood as the role that the owner/manager has as the main actor in the company since he/she is generally the founder of the company, knows the organizational processes, and is in charge of all routine activities (Morris et al., 2006; Wiklund et al., 2011). These studies, in turn, are separated into two streams: those that indicate that the relationship is not significant and that is based on financial indicators such as ROE (Shrader et al., 1997; Lee & Tsang, 2001; Carter et al., 2003; Darmadi, 2013) and those who have found a highly significant relationship use indicators such as growth in sales, employment, and productivity (Smith et al., 2006; Flabbi et al., 2014).

Among the latter are the studies by Alsos and Ljunggren (2017) and Baù et al. (2017) that incorporate the variable age and experience in the professional career as a determinant of organizational performance, noting that women often become much more involved in their careers after the end of motherhood and when work experience has been acquired, thereby increasing self-confidence and fostering the growth of the company.

To measure organizational performance, the scale used takes into account the perception of the businesswoman about the growth of the level of sales, profits, and profitability (Khedhaouria et al., 2015); the perception of environmental management in order to reduce costs and, in the medium term, increase its financial value (Hobson & Essex, 2001) and the perception of investment in corporate social responsibility activities that increase the value and the profitability of the company (Kang, 2010).

2. Materials and method

The applied methodology is quantitative approach, non-experimental design, and all female managers and/or owners in the hotel industry were considered as a population, constituting a population of 85 % of the total hotel businesses existing in two cities in southern Bolivia: Sucre and Potosí. For the study, 190 women who voluntarily agreed to participate in the application of the survey were counted.

The instrument is structured in the first part; it inquires about general data of the hotel company such as changes in income from services, number of employees, hotel seniority, number of beds, and average number of beds occupied per month.

A second part collects information on the businesswoman such as age, years of general experience, years of specific experience, level of training, marital status, number of children, members of her family, shared contribution to family income.

The third part measures the three variables of the study through a 5-point Likert scale, 1 = "strongly disagree" to 5 = "strongly agree" where the value 3 is interpreted as a neutral point.

The validation of the instrument was carried out in three stages: the first stage is related to the pilot test in which 50 surveys were applied without any comprehension problem in the questions. The second stage was exploratory and in it, the sustainability of the factorial structure of the items that constitute the three variables studied was determined: the female managerial profile, market orientation, and organizational performance. For this, a construct validity analysis (exploratory factor analysis) was carried out, using the principal component method and varimax rotation, under the

assumption that the instrument's factors are independent and the distributions are normal (Hair et al., 1999; De la Fuente, 2011).

Once the factorial structure of the instrument had been determined, the reliability of the scale was calculated, in general, and for each of the resulting factors. Said reliability was established using Cronbach's alpha statistic (α).

To access the information, each of the hotel businesses included in the study was visited, consent was requested to administer the questionnaire, and the confidentiality and privacy of the data and information provided were guaranteed. The fieldwork was carried out from December 2017 to July 2018.

For the statistical analysis, a database was created in the IBM SPSS program (version 22), which was used for the exploratory factor analysis and the calculation of the reliability coefficients.

3. Results

3.1. Content validity

The questionnaire was presented to two expert professionals in order to collect suggestions about the writing of the items. Considering the respective recommendations, we proceeded to make changes in some items regarding the form of expression and also to reduce some items. The total number of the original questionnaire was 78 items then they were reduced to 41 according to the content validity: 14 items to measure the female managerial profile; 12 items to measure market orientation and 15 items to measure organizational performance. The final items are presented in Table 1.

Table 1. Items of the instrument

Code	Items
PF1	My skills contribute to the development of new market opportunities for the service provided by my hotel
PF2	My skills positively and directly affect customer satisfaction
PF3	My skills and abilities allow a better response to new customer demands
PF4	I have skills and abilities that have been adapted to the particular needs of the company
PF5	If I am not aware of any aspect related to my duties, I do not hesitate to receive training in this regard.
PF6	I frequently propose new ideas and introduce novelties in my work
PF7	I continually explore the environment to gain new perspectives
PF8	I encourage my work team to question the way of doing things.
PF9	I modify strategies and objectives quickly according to what the competition does
PF10	I integrate new knowledge acquired from the competition
PF11	The moral support of my relatives (parents, siblings, partner) encourages me to perform well in my position within the company
PF12	I receive support to reduce my family burden (childcare and domestic activities) to better fulfill my functions in the company
PF13	I receive support from NGOs to develop my business
PF14	I receive support from the State to develop my business

Código	Ítems
OM1	My actions in the company emphasize customer satisfaction
OM2	I make a lot of effort to understand clients' needs
OM3	I frequently measure customer satisfaction
OM4	My work is based on a strong commitment to clients
OM5	We respond quickly to the actions of the competition
OM6	I share the strategic information of the competition in my company
OM7	I analyze the strengths and strategies of the competition
OM8	My work team knows the market information
OM9	My hotel has competitive advantages over the competition
OM10	In the company, we share customer information between the different departments
OM11	The different departments communicate constantly
OM12	All departments contribute to increasing value to customers
DO1	Our earnings from service sales have been very good in the last three years
DO2	Our earnings have had a considerable increase compared to the previous year
DO3	We have changes in profit margins compared to the previous year
DO4	Our profitability has been better than last year
DO5	Our return on investments last year has been higher compared to that of our main competition
DO6	Our profit last year has been better compared to that of our main competition
DO7	Our market share last year has been better compared to that of our main competition
DO8	Our sales last year have improved compared to our main competition
DO9	The products used to provide the service are ecological
DO10	We do proper management of solid waste
DO11	We have water and energy-saving practices
DO12	The customer is facilitated environmental collaboration within the establishment
DO13	We have formal and explicit donation procedures to the community
DO14	We have policies against discrimination and equal opportunities
DO15	We have alliances with social organizations

3.2. Construct validity

Subsequently, in order to verify the construct validity (factorial structure) of the instrument, an exploratory factor analysis was performed with the principal component method and varimax rotation. Then the results of the data adequacy tests for this type of analysis were analyzed, obtaining the results shown in Table 2.

Table 2. Bartlett Measure and Kaiser-Meyer-Olkin sphericity test of sampling adequacy

Detail		Female profile	Market orientation	Organizational performance
Kaiser-Meyer-Olkin measure of sampling adequacy		**0,830**	**0,840**	**0,886**
Bartlett's test of sphericity	Approx. Chi-squared	1654,437	1382,958	2740,936
	Gl	**91**	**66**	**105**
	Sig.	**,000**	**,000**	**,000**

For the female profile variable, there is a Kaiser-Meyer-Olkin (KMO) index of 0.830; a significant Bartlett's sphericity test (X2 = 1654.437; df = 91; p <0.001); for the market orientation variable, the indicators were Kaiser-Meyer-Olkin (KMO) of 0.840, a significant Bartlett sphericity test (X2 = 1382.958; gl = 66; p <0.001), and finally for the organizational performance variable the Kaiser-Meyer-Olkin (KMO) of 0.886, a significant Bartlett's test of sphericity (X2 = 2740.936, df = 105, p <0.001). In all cases the KMOs were greater than 0.8, this represents a good validity of the instrument (Hair et al., 1999). (Table 2).

Taking the Kaiser-Guttman criterion (Eigenvalues> 1) for the inclusion of factors in the factorial solution, and in the case of the items that represent factor loadings ≥ 0.30 (Table 3), taking into account the dimensions of the three studied variables, the result was a solution made up of nine factors that explain more than 60 % of the variance (Table 4).

Table 3. Matrix of rotated factor and value of communalities (h2)

	Factor									h
	1	2	3	4	5	6	7	8	9	
PF1		.757								.646
PF2		.820								.716
PF3		.855								.783
PF4		.674								.571
PF5	.587									.477
PF6	.706									.621
PF7	.804									.722
PF8	.643									.513
PF9	.797									.657
PF10	.826									.708
PF11			.315							.328
PF12			.339							.378
PF13			.980							.999
PF14			.830							.729
OM1					.729					.556
OM2					.716					.560

	Factor									h
	1	2	3	4	5	6	7	8	9	
OM3					.666					.577
OM4					.876					.798
OM5						.730				.646
OM6						.794				.680
OM7						.816				.798
OM8				.624						.486
OM9				.438						.508
OM10				.736						.582
OM11				.880						.801
OM12				.887						.839
DO1							.815			.709
DO2							.927			.895
DO3							.803			.708
DO4							.891			.822
DO5									.533	.867
DO6									.611	.927
DO7									.642	.946
DO8									.582	.862
DO9								.754		.601
DO10								.792		.663
DO11								.749		.596
DO12								.723		.575
DO13								.639		.429
DO14								.565		.329
DO15								.645		.493

Table 4. Total variance explained

Female manager profile									
Factor	Initial eigenvalues			Square load extraction sums			Rotation sums of squared loadings		
	Total	% of variance	% accumulated	Total	% of variance	% accumulated	Total	% of variance	% accumulated
1	5.968	42.626	42.626	3.924	28.026	28.026	5.007	35.761	35.761
2	1.839	13.135	55.761	2.975	21.249	49.276	1.892	13.514	49.276
3	1.513	10.807	66.568	1.394	9.955	60.338	1.793	12.810	60.338

Orientación al mercado									
Factor	Initial eigenvalues			Square load extraction sums			Rotation sums of squared loadings		
	Total	% of variance	% accumulated	Total	% of variance	% accumulated	Total	% of variance	% accumulated
4	5.365	44.710	44.710	4.990	41.583	41.583	2.882	24.021	24.021
5	2.059	17.155	61.866	1.753	14.608	56.191	2.584	21.531	45.551
6	1.351	11.258	73.124	1.089	9.076	65.266	2.366	19.715	65.266
Organizational performance									
Factor	Initial eigenvalues			Square load extraction sums			Rotation sums of squared loadings		
	Total	% of variance	% accumulated	Total	% of variance	% accumulated	Total	% of variance	% accumulated
7	7.485	49.897	49.897	6.881	45.876	45.876	5.155	34.367	34.367
8	2.949	19.661	69.558	2.811	18.738	64.614	3.698	24.653	59.020
9	1.076	7.173	76.731	.731	4.874	69.488	1.570	10.469	69.488

3.3. Instrument reliability

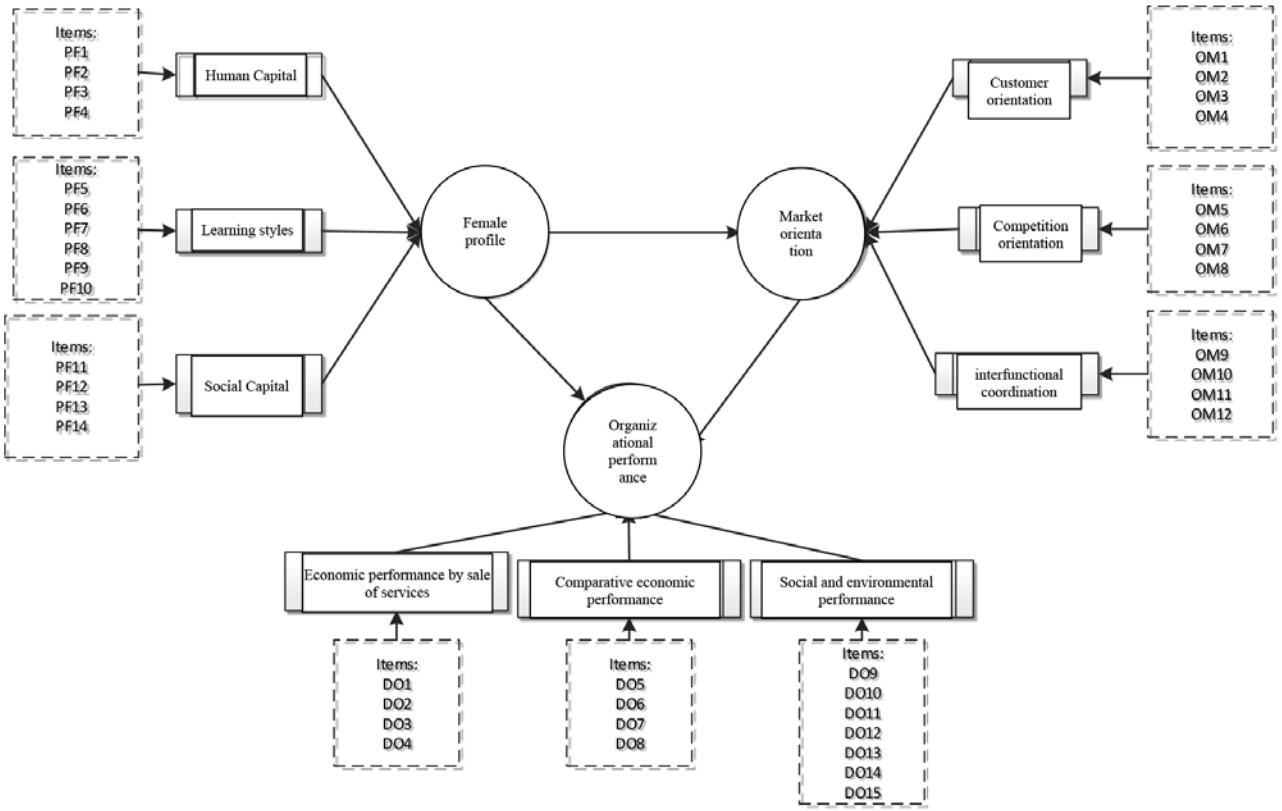
The reliability analysis was carried out through the calculation of Cronbach's Alpha, the result is 0.93 for the scale in general, which is interpreted as an instrument of acceptable internal consistency. The results for each of the factors also show the reliability of the instrument (see Table 5).

Table 5. Reliability coefficient for each factor and the scale in general

Variables	N° of elements	Cronbach's alpha	rho_A	Composite reliability	Average extracted variance (AVE)
Female profile	14	0,88	0.889	0.887	0.613
Market orientation	12	0,86	0.863	0.861	0.608
Organizational performance	15	0,86	0.859	0.858	0.548
Full scale	41	0.93			

Based on the results of the previous exploratory analysis, the theoretical measurement model of the relationship of the three variables considered was built, each constituting the first-order factor with its corresponding dimensions (see Figure 1).

Figure 1. Theoretical measurement model resulting from the validation of the instrument



To finish the validation of the instrument, through a conclusive analysis the indicators of goodness of fit of the model were obtained (Table 6).

Table 6. Goodness-of-fit indicators

Indices	Saturated model	Estimated model
SRMR	0.067	0.067
Chi squared	360.338	360.338
NFI	0.789	0.789

Table 6 shows the RME (Standardized Root Mean Square Residual, SRMSR) test that shows that the fit is optimal with a value of 0.067 less than 0.08; the IAN Normed Fit Index (NFI) with a low value typical of small samples (Ullman, 2006).

4. Conclusions and discussion

Regarding construct validity and internal consistency, the questions or items show adequate discriminatory power to be used in similar populations. In the case of the variables of market orientation and organizational performance, a grouping of items close to the scales theoretically proposed for market orientation of Narver and Slater, (1990) and Jaworski and Kohli (1993) and of organizational performance de Hobson and Essex (2001), Kang (2010) and Khedhaouria et al. (2015) is observed.

Market orientation is measured through three factors: customer orientation, competition orientation, and inter-functional coordination, which explain 65.27 % of the variance resulting from the extraction process by the main component method.

For organizational performance, the resulting scale includes three factors: economic performance from the sale of services, comparative economic performance, and social and environmental performance, these factors explain 69.48 %.

In the case of the female profile variable, a new structure has been built based on three theoretical pillars: human capital, adapting the scale of Millán et al. (2014); learning styles based on the scale of Gómez et al. (2015) and social capital adapting the scale of Liñán and Santos (2006) and Kantis et al. (2001), the factor analysis indicates that these three factors explain 60.34 % of the total variance.

The values obtained for both content validity and construct validity and internal reliability reveal that the instrument meets the minimum requirements of the applied statistical tests; that is, it is valid and reliable.

There is a consistent factorial structure with items that adequately measure the three variables for small samples.

It is provided theoretically and empirically with the development of an instrument that measures the relationship of the managerial profile, market orientation, and organizational performance with a gender perspective.

The practical implications of the results of this study refer to 1) The application of the instrument and its analysis to measure the relationship of the three studied variables in any other business context. 2) Measurement of the female managerial profile taking into account not only the sociodemographic variables that determine their characterization but also analyzing social capital and human capital. 3) Generate information to improve the management of companies run by women.

The new lines of research that could be established based on the findings of this work may be focused on the application of the instrument to obtain conclusive studies regarding the comparison between the female and male managerial profiles, taking into account the relationship with customer orientation, market, and organizational performance, it also opens the possibility of studying the relationship of the three variables in industries other than the hotel industry.

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Effect of job satisfaction and confidence on the organizational climate, through structural equations

Efecto de la satisfacción laboral y la confianza sobre el clima organizacional, mediante ecuaciones estructurales

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Abstract

In the field of public health there is a need to reach new achievements and make improvements in the care of people, not only to increase the satisfaction of users, but also to increase the satisfaction of the workers themselves, on the productivity of employees of public health institutions. The improvement in areas of organizational behavior can affect and benefit the productivity of health care employees, including a reduction in absenteeism rates and improvements in the quality of care provided to users. The present study analyzed a high complexity hospital, with the objective of determining if there is a relationship between job satisfaction and interpersonal trust and organizational climate. The study is cross-sectional and correlational. The measurement instrument is a survey consisting of 4 questionnaires, the sample consisted of 344 employees. Structural equation models were applied and two models were generated: the original model (Organizational Climate = β_1 Job Satisfaction + β_2* Interpersonal Trust + Error) and an alternative model (Organizational Climate = $\hat{\beta}_1$* Job Satisfaction + Error). It is concluded that job satisfaction has a positive and statistically significant relationship on organizational climate, here satisfaction with the work group and opportunity for development are privileged. The perception of interpersonal trust was not statistically relevant in the context studied.*

Resumen

En el campo de la salud pública existe la necesidad de alcanzar nuevos logros y realizar mejoras en el cuidado de las personas, no solo para aumentar la satisfacción de los usuarios, sino también para aumentar la satisfacción de los propios trabajadores, con respecto a su productividad como empleados de instituciones de salud pública. La mejora en ámbitos del comportamiento organizacional, puede afectar y beneficiar la productividad de funcionarios del área de la salud, incluyendo una reducción en los índices de ausentismo y mejoras en la calidad de atención otorgada a los usuarios. Esta investigación analizó un hospital de alta complejidad, con el objetivo de determinar si existe una relación de la satisfacción laboral y la confianza interpersonal con el clima organizacional. El estudio es transversal y correlacional. El instrumento de medición es una encuesta que consta de cuatro cuestionarios, la muestra quedó conformada por 344 funcionarios. Se aplicaron modelos de ecuaciones estructurales y se generaron dos modelos: modelo original (Clima organizacional = β_1* Satisf. Laboral + β_2* Conf. Interpersonal + Error) y modelo alternativo (Clima Organizacional = $\hat{\beta}_1$* Satisfacción Laboral + Error). Se concluye que la satisfacción laboral tiene una relación positiva y estadísticamente significativa sobre el clima organizacional, aquí se privilegian la satisfacción con el grupo de trabajo y la oportunidad de desarrollo. La percepción de confianza interpersonal no fue estadísticamente relevante en el contexto estudiado.

Keywords | palabras clave

Organizational behavior, organizational climate, job satisfaction, interpersonal trust, perception, structural equations, causality, hospitals.

Comportamiento organizacional, clima organizacional, satisfacción laboral, confianza interpersonal, percepción, ecuaciones estructurales, causalidad, hospitales.

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1. Introduction

Within the public bodies that are part of society, we find health services which are important for society, since they meet the health and emergency needs of the population. But what is public health? According to Winslow (1920), public health has the mission of reducing the ailments caused by diseases, prolonging life, and promoting healthy living through the organized effort of society. Then in 2015, Piédrola stated that public health is a science that has the power to manage joint efforts aimed at protecting, promoting, and restoring people's health.

For better management of human resources, the study of organizational behavior is necessary, a discipline that is responsible for analyzing the behavior of people and their experiences in the workplace and training from an individual, group, and organizational perspective (Robbins, 2004). This is well documented in the study by Castro and Martins (2010), where they expose the importance of analyzing satisfaction levels and how workers within the organization perceive the organizational climate, in order to avoid the sudden departure of the worker. On the other hand, it is important to create an environment of interpersonal trust in the organization that is the basis that sustains and promotes change processes (Razeto, 2016).

This paper aims to analyze and study the relationships between three variables of organizational behavior: organizational climate, job satisfaction, and interpersonal trust, using structural equation models. This methodology will be applied in a High Complexity hospital, according to the General Technical Standard No. 150 of the Ministry of Health of Chile (2013).

1.1. Organizational climate

Currently, the organizational climate is important for organizations that constantly seek to improve the work environment, which is why the climate is considered a key element in the progress of organizations, and its detailed analysis directly affects the essence of the organization (Segredo, 2013).

Organizational climate is one of the most complex variables to define within the literature related to organizational behavior. Different authors, through their studies, have established their own definitions regarding this issue (Segredo, 2013).

The origin of this concept comes from the research of Lewin (1936), who indicated that human behavior depends on the situation where the behavior occurs. However, it has its beginnings in the 60s within organizational psychology by Gellerman (1960, mentioned by García, 2009), and has been studied by various authors.

Among the different approaches to this concept, the one that has shown the greatest benefit is when the perception that workers have of the structures and processes that occur in the workplace is used as a primary element (Goncalves, 1997). The same author in 2000 (cited by García, 2009), states that the elements and structures of the organization give place to a specific climate, in functionality of the members' appreciations. This resulting climate encourages certain behaviors in people and these impact the organization and the climate, thus completing the circuit.

The organizational climate seen from the area of public health contributes to the organization of health facilities allowing to identify what strengthens the quality of work-life of health personnel, this is due to the influence that the organizational climate has on motivation and the performance of workers, which also affects productivity, satisfaction, commitment and quality of work (Bustamante-Ubilla et al., 2015; Agudelo et al., 2017; Manosalvas et al., 2015; Bernal et al., 2015).

According to Jeung and Chang (2021), having a cooperative and friendly organizational climate within the organization among its members can alleviate negative con-

ditions such as emotional disharmony or dissonance. A positive organizational climate could be achieved through internal efforts by organizations to reduce work stress and weaken negative outcomes.

1.2. Work satisfaction

According to Judge et al. (2017) job satisfaction has been one of the most studied aspects of organizational behavior of the 20th century, and one of the important reasons to be interested in this variable is to understand different variables related to the efficiency of the organization, such as organizational commitment, turnover, absenteeism, and performance (Tsaousis et al., 2007; Harrison et al., 2006; Kammeyer-Mueller et al., 2005 cited in Pujol-Cols & Dabos, 2018).

In 1962, Porter defined job satisfaction as the difference between the reward perceived as adequate by the worker and the reward actually received. Later Locke (1976), believes that it is a positive or pleasant emotional state that arises from the subjective perception of the individual's work experience.

Bravo et al. (2002), state that job satisfaction can be defined as the favorable or unfavorable feeling with which employees perceive their work. This attitude can refer to a single worker or at a general level within a group, in turn, it can be analyzed in terms of a person's general work, or applied to a specific area of work.

Robbins (2004) defines job satisfaction as the general attitude of an individual towards his job. Then, Fritzsche and Parrish (2005) state that it is the degree to which employees like their work.

Li et al. (2020), state that job satisfaction is a factor at the individual level, which reflects the affections and emotions of the employee towards his work.

In general, the authors agree that job satisfaction is a set of emotions generated in workers, due to experiences of both individual and organizational situations, which consequently produces pleasant or negative satisfactions (Hosie et al., 2007; Hospinal, 2013; Serrano et al., 2015 cited in Pedraza, 2020).

1.3. Interpersonal trust

Based on the studies carried out by Mishra and Spreitzer (1998), and Werner and Whitener (1998), in general terms, it can be defined as a psychological state in which a person is willing to believe and establish positive expectations regarding the intentions of others.

Lewicki et al. (1998) define interpersonal trust as the positive expectations that an individual has regarding the behavior of others, supported by beliefs that the other has honest intentions.

A broad and interdisciplinary definition defines trust as a psychological state that involves a willingness to be vulnerable to the actions of other people and that is based on positive expectations of the intentions or behaviors of others, according to Rousseau et al. (1998), all these definitions place this construct as relevant when studying organizational behavior.

Worrying about creating an environment of trust in the organization allows interpersonal trust to be the basis that sustains and promotes change processes and that motivation, involvement, collaboration, and loyalty among individuals are greater (Razeto, 2016).

Covey and Merrill (2007), state that when the members of an organization have confidence, there is an increase in speed and a decrease in the closed groups of the company, in turn, organizational productivity is positively affected. This indicates that trust can play an important role in the effectiveness of personnel management within

organizations, achieving cooperation between people, promoting solidarity, and facilitating the creation of a more inclusive and integrating group (Misztal, 1996).

1.4. Relevant studies

This work follows the line of the authors Chiang et al. (2011), where a preliminary study is carried out on the variables organizational climate and job satisfaction applied to workers in the health sector. The main objective was the contribution of elements for the improvement in hospital management and the quality of work-life of the workers belonging to these health centers. Then, based on this research and to deepen the relationship between the studied variables, the variable interpersonal trust was added and the following hypothesis was proposed: the organizational climate is affected by the variables job satisfaction and interpersonal trust. This was done through structural equations.

2. Materials and method

This work considers the study of the already explained psychological aspects, in a highly complex hospital context. Regarding the sample, it was made up of 344 staff members. The instrument used was the survey. The statistics are shown below (the calculations have been made using the SPSS 22.0 software):

a. Organizational climate: based on Koys and Decottis (1991) it was adapted and validated by Chiang et al. (2008). It has 42 items distributed in eight subscales, and expressed on a five-point Likert scale ("Strongly Agree" -5- to "Strongly Disagree" -1-). Table 1 shows the reliabilities of each subscale, and the descriptive statistics.

Table 1. Statistics for the organizational climate questionnaire

Factor	N° Items	α	Mean	Standard deviation
Autonomy	5	.821	3,74	0,98
Cohesion	5	.847	3,60	0,98
Trust	5	.741	3,97	0,98
Pressure	7	.795	3,47	1,20
Support	5	.820	3,76	1,05
Recognition	5	.814	3,29	1,18
Equity	5	.725	3,67	1,04
Innovation	5	.835	3,69	1,02
TOTAL	42	.955		

Source: Own elaboration

b. Job satisfaction: prepared by Chiang et al. (2008), for workers of public institutions. It consists of 39 items, divided into six subscales, plus two individual items (Satisfaction with the ability to decide autonomously and Satisfaction with the recognition received from the authorities, these items do not belong to any of the subscales) that will not be considered in the analysis. Table 2 shows the general results of the application of the instrument.

Table 2. Statistics for the job satisfaction questionnaire

Factor	N° Items	α	Mean	Standard deviation
General work (SL-I)	11	.897	3,60	0,96
Physical work environment (SL-II)	7	.860	3,28	1,19
How the work is done (SL-III)	6	.850	3,68	0,99
Development opportunities (SL-IV)	8	.821	2,93	1,11
Relationship with the boss (SL-V)	4	.945	3,61	1,01
Remuneration (SL-VI)	3	.832	2,53	1,11
TOTAL	39	.949		

Source: Own elaboration

c. Interpersonal trust, a scale based on Mc Allister's (1995) Interpersonal Trust Scale, measures trust in three different aspects: affective, cognitive, and organizational, and they are coded from C1 to C17. Table 3 shows the reliabilities and the general descriptions.

Table 3. Statistics for the interpersonal trust questionnaire

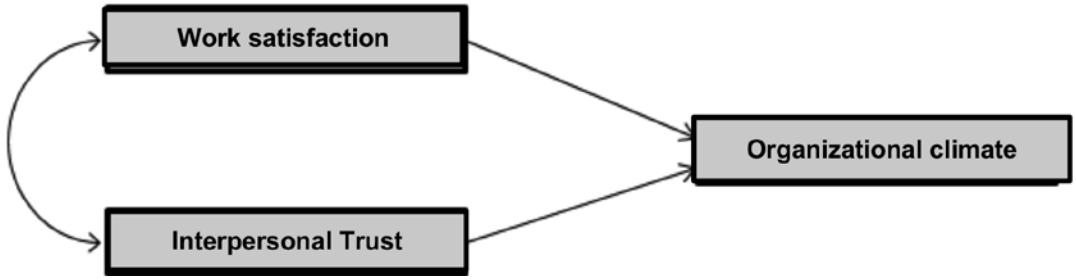
Factor	N° Items	α	Mean	Standard deviation
Affective	6	.882	3,72	0,92
Cognitive	6	.840	3,74	0,88
Organizational	5	.856	3,67	0,76
TOTAL	17	.927		

Source: Own elaboration

2.1. Factorial structure

In the first place, the parameters were estimated by performing a Causal Analysis, which tries to confirm the theoretical construction of the factors generated by each of the traits considered in the research, adding a cause-effect component between them, where organizational climate, job satisfaction, and interpersonal trust were simultaneously involved. The proposed theoretical structure is graphically described in Figure 1, where the endogenous variable is the organizational climate, and the exogenous variables are job satisfaction and interpersonal trust, where these two covariate with each other.

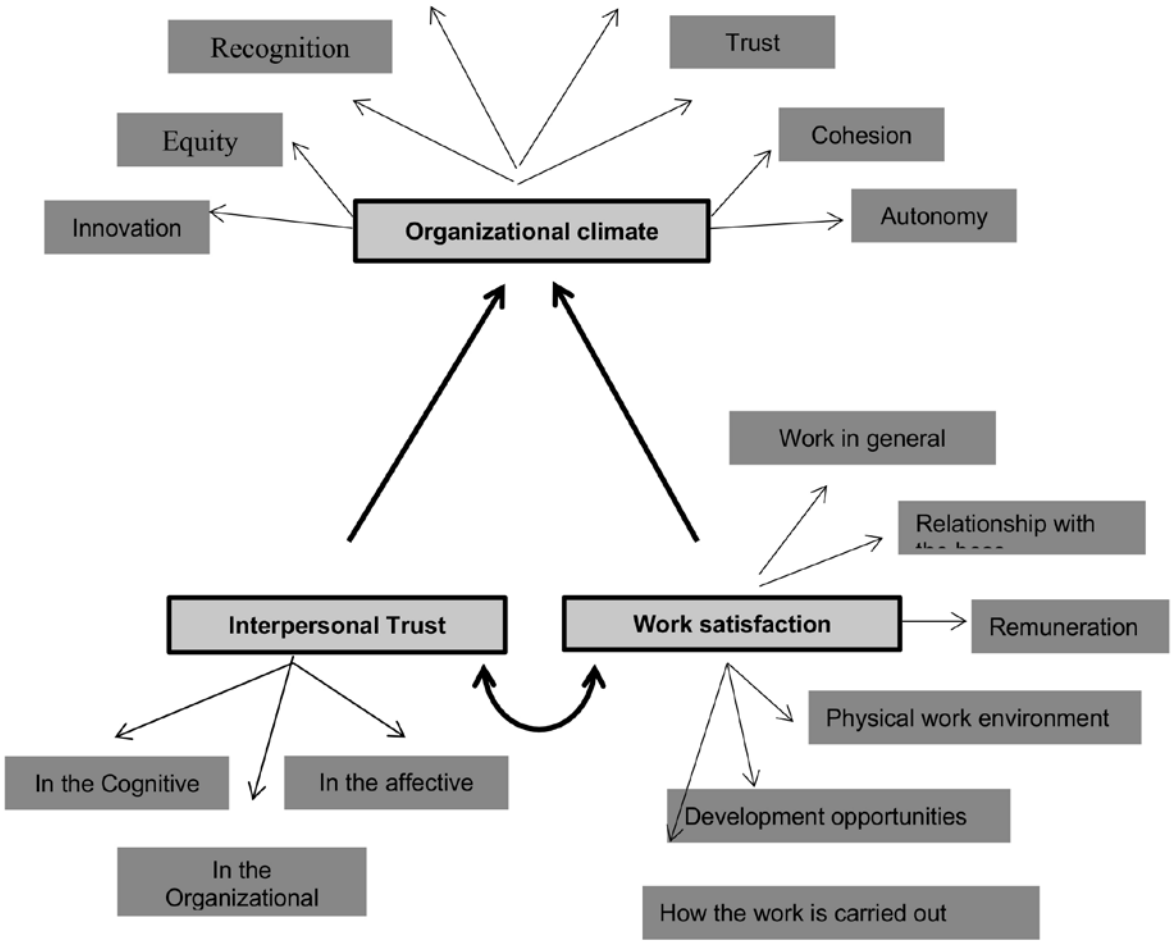
Figure 1. Proposed theoretical relationship



Source: Own elaboration

In particular, each of these latent variables has its own predefined factorial structure, which will be attached to the theoretical model generating a more complex configuration. It should be noted that each of the factors is also a latent variable. The detail of the structures for each concept is shown below: first, the dependent variable organizational climate is organized as indicated in table 1; second, the independent variable job satisfaction is organized as shown in table 2; and finally, the independent variable interpersonal trust, as shown in table 3. In summary, the general theoretical model proposed in accordance with the theory and with the previous analyzes are shown in Figure 2.

Figure 2. Extended theoretical model



Source: Own elaboration

The latent variables are manifested in the gray ones, and in turn, each of these is manifested in the items that correspond to it. The estimation method used is that of Generalized Least Squares since it provides more robust estimates in the absence of multinormality, and it does not require an excessively large sample size, thus it is the most appropriate for this case.

The decision criteria of the model are Goodness of Fit (X^2, SRMR, GFI.), Incremental Indices (CFI, TLI, IFI, AGFI.), Parsimony Indices (PGFI, PCFI, X^2), Standardized Residuals (In absolute value less than 2) and Coefficient of Determination (% of variance explained by the factors).

In the first instance, the iterative estimation processes did not converge after the amount allowed by the algorithm incorporated in the sem package of R. One consequence was the appearance of the so-called "Heywood cases" (negative variances, standardized estimates greater than one), therefore variables were gradually eliminated until the first reasonably coherent estimators were obtained, without this type of inconvenience.

3. Results

The causal model was estimated using the structure of figure 2, and for this, we worked with a sample of N_{AC} = 344 officials from a highly complex hospital.

3.1. *Original model*

The model to be estimated is analytically expressed as:

Organizational climate = β_1* Job Satisf + β_2* Interpersonal Trust + Error, where β_1 and β_2 are the parameters to be estimated.

Table 4a. Estimation of the original model

Exogenous Variable → Endogenous Variable	Estimate	|t|	p-value
Job Satisfaction → Organizational Climate	1.143 (0.092)	12.39	.000***
Interpersonal Trust → Organizational Climate	0.021 (0.022)	00.95	.170

***Significant at 1 %
Source: Own elaboration

The results in table 4a show that the job satisfaction factor has a positive and statistically significant relationship on the organizational climate (β_1 = 1.143, p = .000 ***), while interpersonal trust has a positive coefficient, but not favorable enough to consider it significant (β_2 = 0.021, p = .170). This suggests estimating an alternative model without considering this dimension, the results are shown later in letter b) Alternative model.

As for the factors of each variable (figure 3), the organizational climate is effectively manifested on four of them, leaving another four discarded. The job satisfaction variable is manifested only on two of its six factors. The interpersonal trust variable did not appear significantly on its factors. (See table 4a)

Table 4b. Global fit indices

	Global Goodness of Fit			Global Adjustment Indices	
Goodness of fit	X^2	df	p-value	SRMR (Closer to 0)	GFI ≥ 0.90
Original model	666.7	398	.000	0.063	0.896

Source: Own elaboration

The global goodness-of-fit measures are shown in Table 4b. In the original model, the hypothesis of equality of variance matrices and theoretical covariances (X^2=666.7,p=.000***) is rejected, and reviewing the global adjustment indicators, SRMR is considered adequate as close to zero, but GFI is four thousandths below the 0.90 threshold. In conclusion, the model can be improved from the point of view of proposing an alternative model (See table 4b).

Table 4c. Incremental fit and parsimony indices

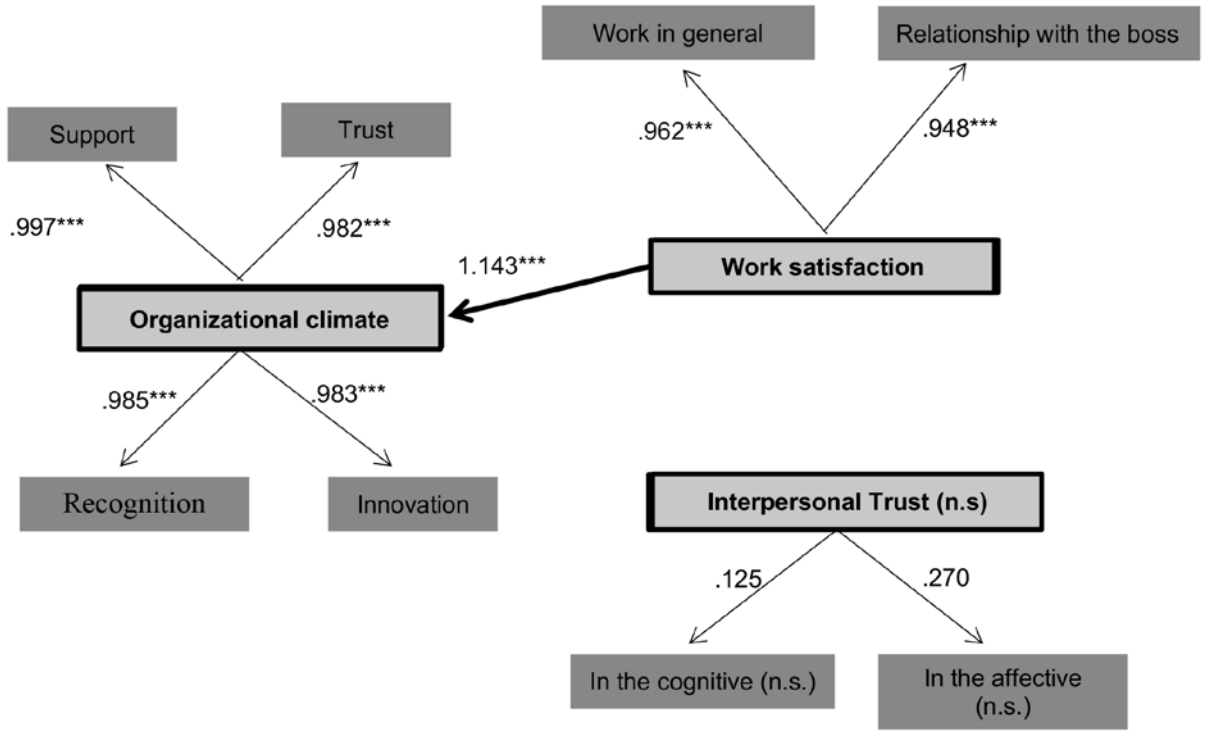
	Incremental Adjustment Rates (todos ≥0.90)				Parsimony indices		
	CFI	TLI	IFI	AGFI	PGFI (≥0.90)	PCFI (≥0.90)	X^2 (Between 1 and 3)
Original model	0.519	0.475	0.549	0.852	0.745	0.475	1.675

Source: Own elaboration

Table 4c shows the incremental adjustment indices, which reveal indicators considered of medium quality, therefore a modification is pertinent. Then, the parsimony indicators reveal much more encouraging indices than in the previous case, but also with options for improvement (See table 4c).

The analyzes show that none of the values of the standardized residuals matrix is greater than 2 in absolute value, evidencing the effectiveness of the model in reproducing the matrix of variances and covariances. The structural model diagram is shown in figure 3. In conclusion, and based on Escobedo-Portillo et al. (2016), the resulting model has good properties with possibilities for improvement, which is shown in the next section (see figure 3).

Figure 3. Extended theoretical model



Source: Own elaboration

3.2. Alternative model

This model consisted of a slight modification of its factorial structure, taking into account the restructuring of the job satisfaction variable, after carrying out a re-exploratory factor analysis of the original database corresponding to this concept. The analysis has established a new factor called "satisfaction with the workgroup" (SL-VII), the result of eliminating three items from the factor "satisfaction with work in general" (SL-I), whose question format is similar. In addition, the "pressure" and "remuneration" factors of the variables organizational climate and job satisfaction, respectively, were discarded. The interpersonal trust variable has not been considered either, as it is not statistically relevant in the original model.

Therefore, the model to be estimated takes the following form:

Organizational Climate = $\hat{\beta}_1$* Job Satisfaction + Random error, where β_1 is the parameter to be estimated.

The results are those shown in table 5a, where the job satisfaction factor has a positive and statistically significant relationship on the organizational climate ($\hat{\beta}_1$=2,071, p=.000***). Regarding the factors (figure 4), the organizational climate variable is effectively manifested in five dimensions. The job satisfaction variable is manifested only on two of the six proposed factors (See table 5a).

Table 5a. Alternative model estimation

Exogenous Variable→Endogenous	Estimate	|t|	p-value
Job Satisfaction→Organizational Climate	2,071 (0,362)	15,72	,000***

Source: Own elaboration
***Significant at 1 %

Table 5b. Global fit indices

	Global Goodness of Fit			Global Adjustment Indices	
Goodness of fit	X^2	df	p-value	SRMR (Closer to 0)	GFI ((≥0.90)
Modelo Original	1626.7	397	.000	0.098	0.878

Source: Own elaboration

Table 5c. Incremental fit and parsimony indices

	Incremental Adjustment Rates (all ≥0.90)				Parsimony indices		
	CFI	TLI	IFI	AGFI	PGFI (≥0.90)	PCFI (≥0.90)	X^2_N (Between 1 and 3)
Original model	0.865	0.679	0.868	0.857	0.801	0.789	1.579

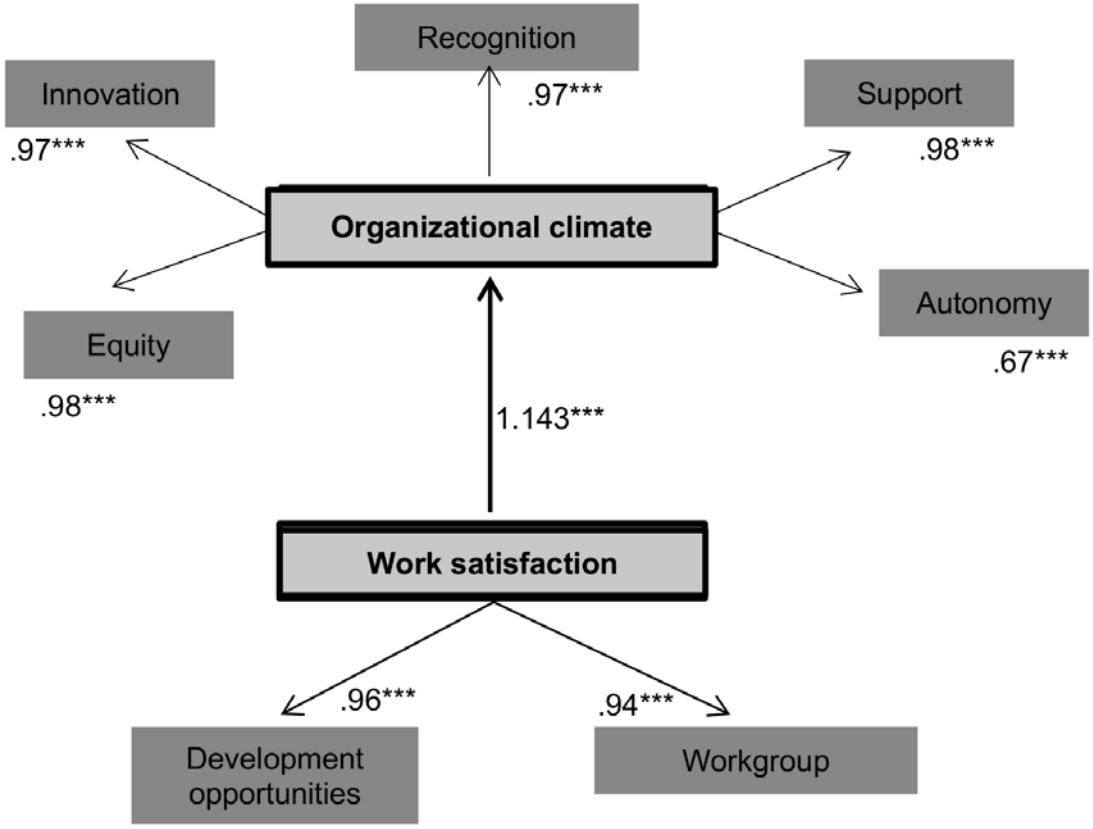
Source: Own elaboration

The global goodness-of-fit measures are shown in Table 5b. In this model, the chi-square value is much lower than in the null model (table 4b), so it is a quantitative advance in the improvement, the GFI index remains at its levels, as well as the SRMR, which increases to a value of 0.098, more than double (See table 5b).

Table 5c shows the incremental adjustment indices, all with values slightly lower than 0.9, showing a considerable increase with respect to the original model and showing the effectiveness of the change in the factors. On the other hand, the parsimony indicators reveal much more encouraging indices than in the previous case (table 4c), but also with options for improvement. From this, it can be concluded that the model presents notable improvements in its indicators (See table 5c).

Regarding the values of the matrix of standardized residuals, only 7.7% of them (36/465) is greater than 2 in absolute value, which shows the effectiveness of the model in reproducing the matrix of variances and covariances. The diagram of the structural model is shown in figure 4. The resulting model has good properties, leaving the possibilities for improvement open (See figure 4).

Figure 4. Extended theoretical model



Source: Own elaboration

4. Conclusions and discussion

This work was based on the following: (1) The confirmatory analysis of the factors provided in the theory related to the variables of organizational behavior, (2) provide more information for decision-making within hospital settings, (3) an application of the structural equation models to a real case.

According to the results obtained in this study, the job satisfaction factor has a positive and statistically significant relationship with the organizational climate. These results are consistent with the study by Araya and Medina (2019), where they found that organizational climate and job satisfaction have a statistically significant relationship. The appreciation of a high organizational climate is due to the fact that employees

have higher levels of job satisfaction. Similar results are observed in the study carried out by Coronel et al. (2020), who state that when analyzing the relationship between organizational climate and job satisfaction, the obtained results revealed a positive relationship, which allowed them to confirm the hypothesis that increasing or improving the organization's climate leads to greater satisfaction of the organization's workers.

It has been shown that the study subjects mostly consider the factors of organizational climate of support, recognition, and innovation as an effect of the perception of positive job satisfaction with respect to the workgroup to which they belong and the development opportunity that is offered to them. According to the study by Macías and Vanga (2021), the organizational climate is affected by the current condition of the workplace, since the success of the development of work activities depends on the confidence that the employee has in his abilities.

This is why camaraderie and healthy competition among employees must also be promoted to improve the organizational climate.

This occurs naturally, since being satisfied with colleagues and being able to grow professionally, would allow us to perceive that a mistake will not be reprimanded, instead there will be support to improve and that the contribution one makes towards the fulfillment of objectives will be recognized by the rest of the staff, in addition to being able to generate new instances to improve within the work. Similar results were obtained by Pedraza (2018), in his study, public employees rated with a high level of importance aspects that facilitate communication between workers and bosses, also that bosses maintain a closeness with the employee to provide guidance, support, and security for developing their work.

In the adjusted model (figure 3), it was observed that the organizational climate is an effect of job satisfaction with the job in general and with the relationship with the boss, this determines the level of validity of the relationships between the latent variables. While in the second model (figure 4) there is the Development Opportunity and a new factor formed from three items that came out of the Work factor in general, which was called the Workgroup, thus it is observed that in both models, the three items that make up the new factor appear as important in order to describe job satisfaction.

For officials of highly complex hospitals, the workgroup, that is, the relationship with colleagues, the spirit of collaboration and help, is important.

Regarding the systematic part, the significance of the chi-square test in both cases (table 4a and table 5a) is due to the sample size, which the larger it is, the greater the probability of rejecting it. However, the global adjustment measures (table 4b and table 5b) are similar in both models, reaching adequate levels in the SRMR index (0.063 and 0.098 respectively), evidencing the suitability of the obtained estimates, that is, without considering the other measures. With respect to the incremental adjustment, there is a clear advantage for the alternative model, giving higher indices than in the original (table 4b and table 5b). Regarding parsimony, the PGFI and PCFI indices are higher in the alternative model, due to the lower number of parameters to be estimated.

Through the analysis of the results, it can be concluded that the organizational climate is important in the management of human resources, this is also proposed by Zambrano et al. (2017), in their study, they affirm that the organizational climate occupies a relevant space in the management of organizations, it is important to know it, in order to achieve high job performance, increase commitment and cooperation between employees so that they feel part of a successful working group. Macías and Vanga (2021), highlight the importance of the study of the organizational climate and motivation within organizations since it allows establishing what is necessary for the

fulfillment of organizational objectives, determining the strategies to be used, and the necessary actions that allow fulfilling the organizational mission and vision.

This research is a contribution to the entity under study since its results generate information that will help develop the necessary changes within the organization for better management. This is also explained by the study by Fajardo et al. (2020), where they argue the importance of studying the organizational climate within the health sector since it is considered as a strategic tool that provides information in relation to the processes that determine behaviors within the organization, helping the permanent improvement of the institution. In addition, this study carried out in the health area could lead to a better quality of service delivered to users, who in turn are workers from other institutions, this would lead to an increase in the quality of life of all of them.

Agudelo et al. (2020), in their study, included the perception of users of health institutions, concluding that having a satisfactory organizational climate does not necessarily guarantee that users perceive the same in the health care they receive. Unlike the study by Agudelo et al. (2020), this research does not include the perception of the users, but it does include the satisfaction of the employees that could affect the perception of the users when they receive the attention of these health workers.

Interpersonal trust has not been statistically relevant in the studied contexts, probably giving indications that for health workers it is not that necessary when carrying out daily tasks, but appears gradually as objectives are achieved.

As a suggestion for future research, it would be necessary to consider how the type of worker influences the model, be it health, administrative or managerial personnel, an aspect not considered in this study. The variable Interpersonal trust has not been found to be significant, thus this variable could be eliminated and another one related to organizational behavior could be sought.

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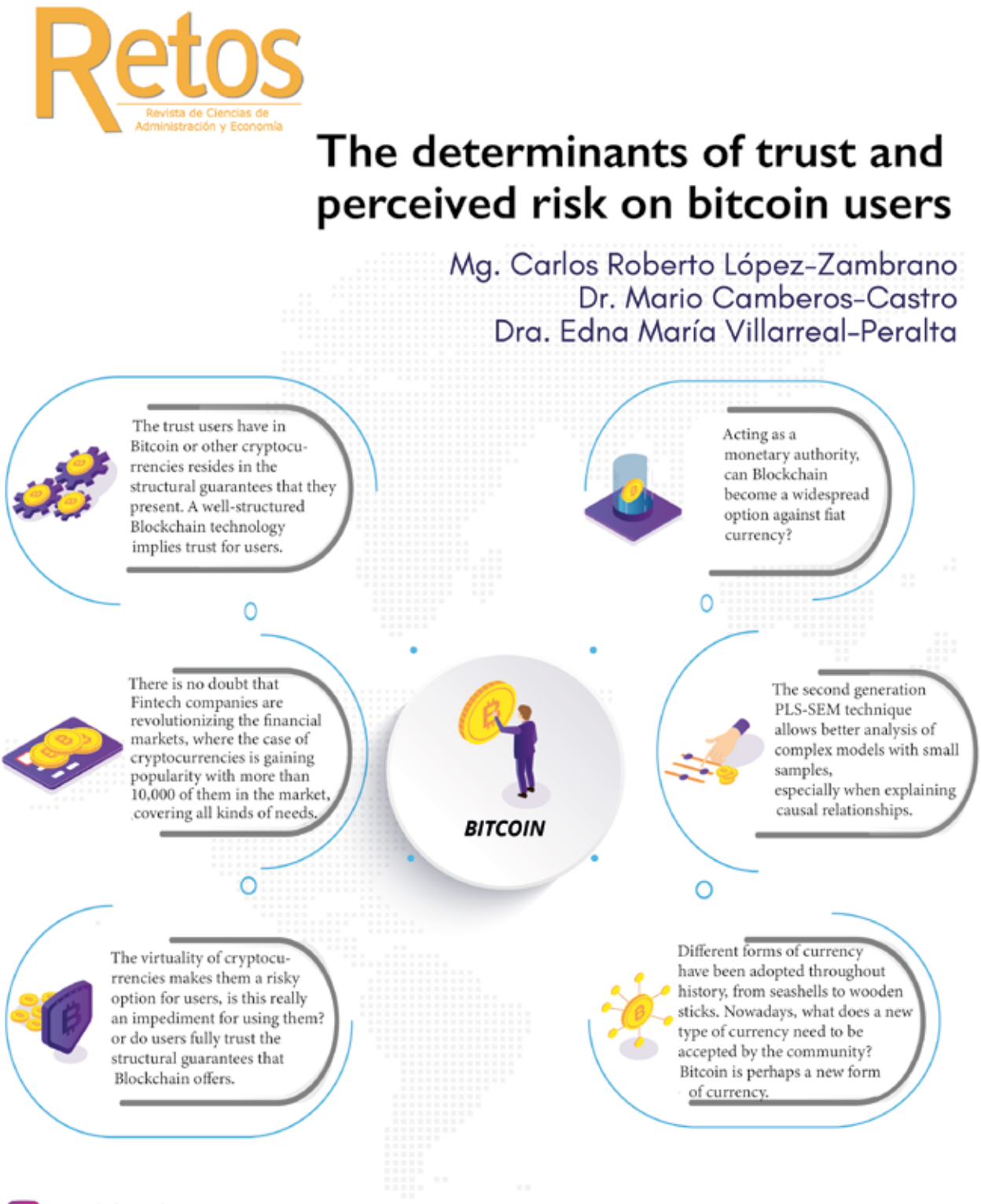
Anexos



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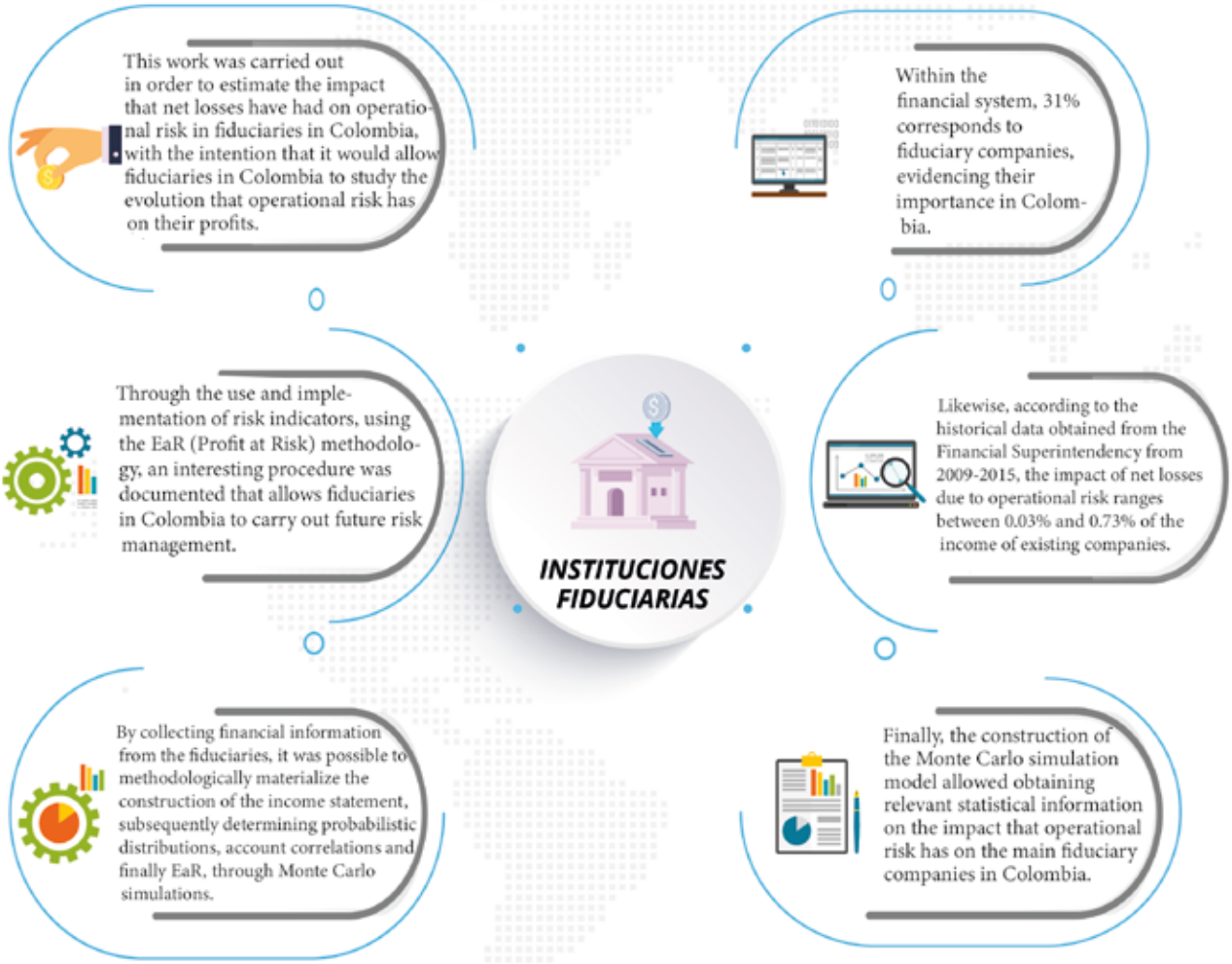

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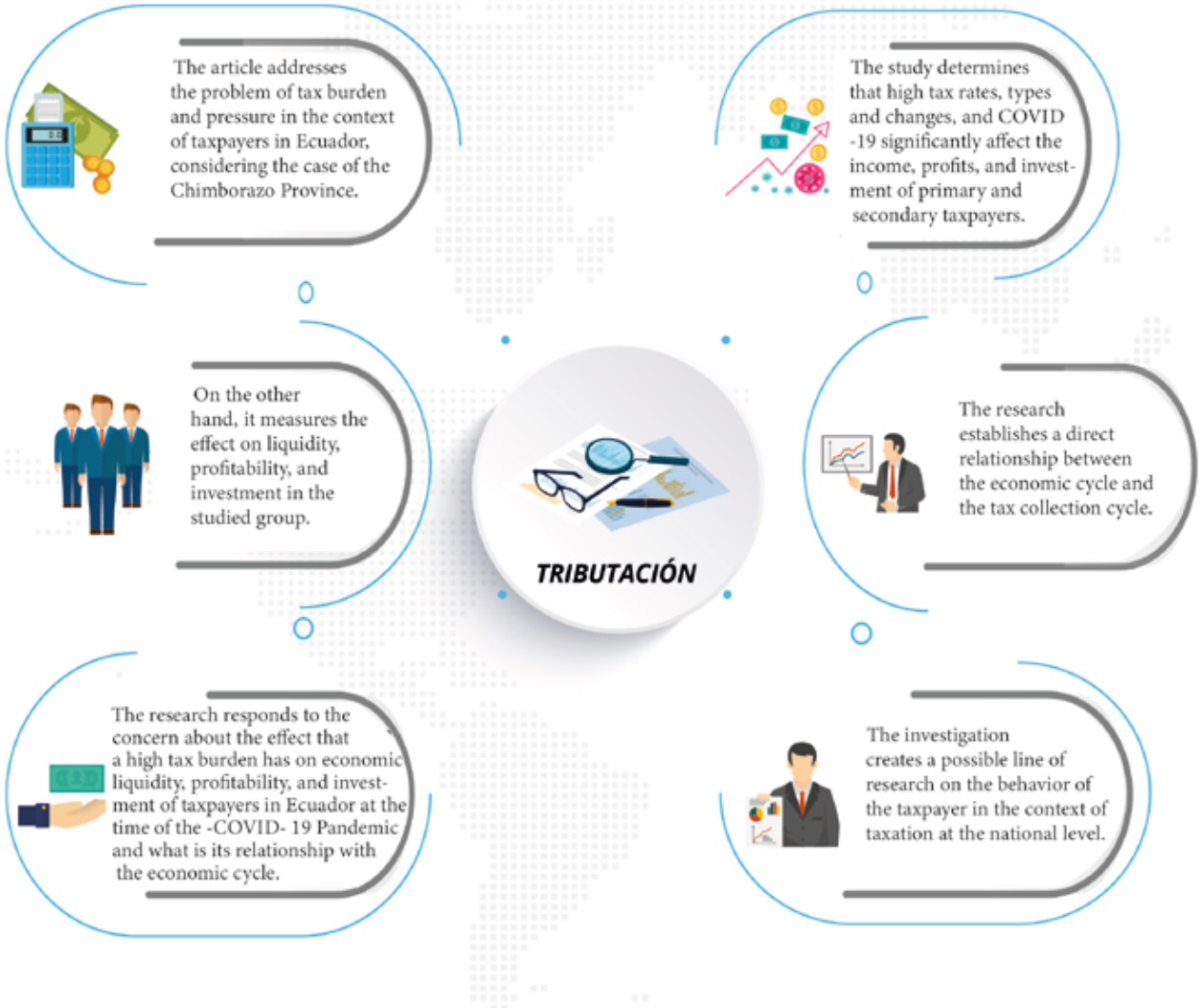

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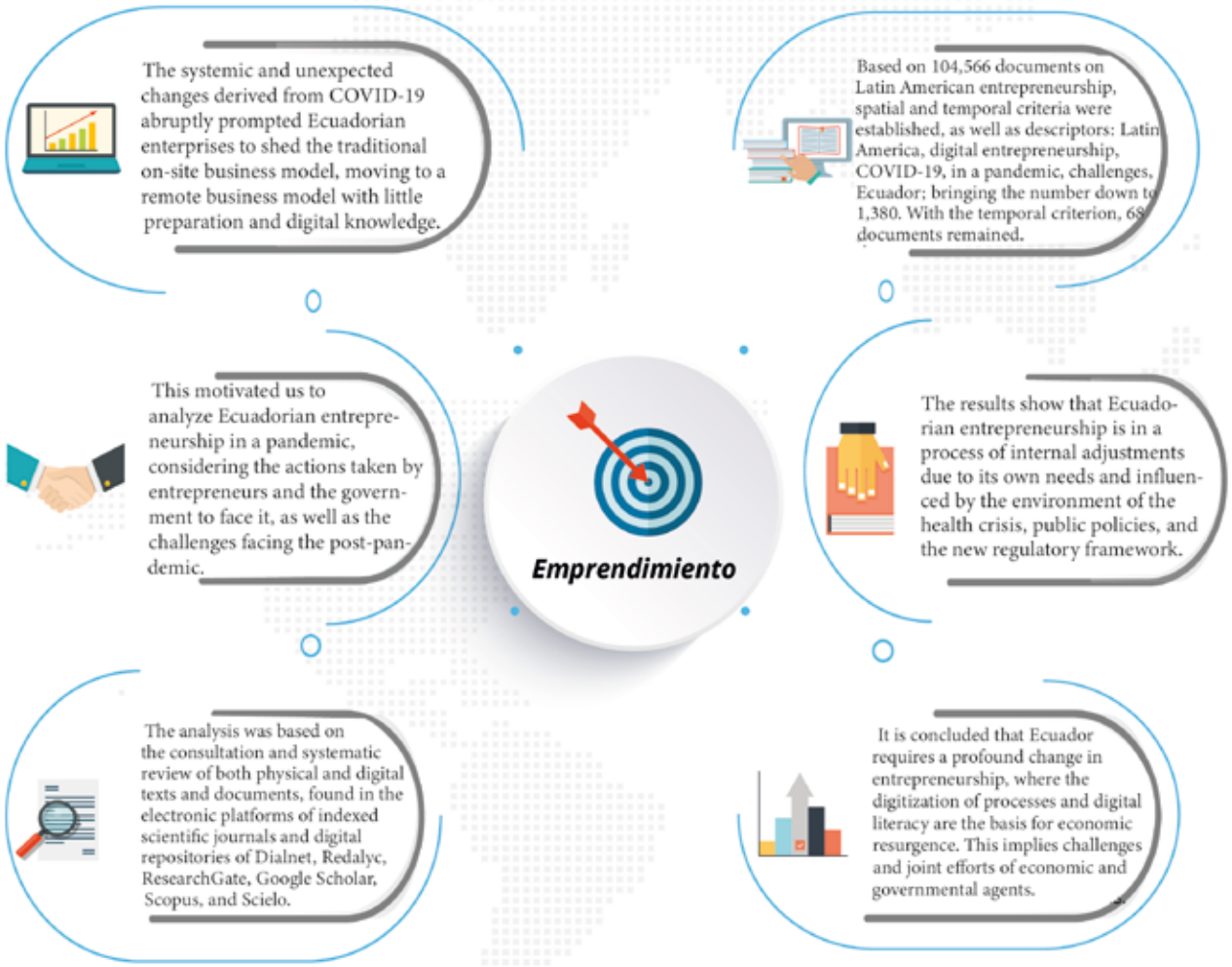

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Effect of job satisfaction and confidence on the organizational climate, through structural equations.

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Mg. Juan Pablo Hidalgo-Ortiz
Mg. Nelly Gómez-Fuentealba

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Basic writing rules

Universidad Politécnica Salesiana del Ecuador

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2. Scope and policies

2.1. Themes

Original contributions in Development issues, as well as related fields: Public Administration, Social Economics, Marketing, Tourism, Entrepreneurship, Management...and all other disciplines related to the central thematic issue.

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"Retos" preferably publishes the results of empirical research about Development, written in Spanish and/or English, while reports, studies, and proposals are also accepted, as well as reviews of state-of-the-art literature.

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Papers are to be presented with Arial 10 typeface, single line spacing, all justified, without indentation or blank spaces between paragraphs. A space is only to be included between the major sections (title, authors, abstracts, keywords, credits, and epigraphs). All margins on each page must be 2 cm.

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For papers that are empirical research, the manuscripts are to follow IMRDC structure, while Notes and Contributions epigraphs are optional. Papers that constitute reports, studies, proposals, and reviews are afforded greater flexibility in terms of epigraphs, especially in relation to Materials and Methods, Analysis and Results, and Discussion and Conclusions. All types of papers are required to include References.

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Journal article (up to six authors): Ospina, M.C., Alvarado, S.V., Fefferman, M., & Llanos, D. (2016). Introducción del dossier temático "Infancias y juventudes: violencias, conflictos, memorias y procesos de construcción de paz" [Introduction of the thematic dossier "Infancy and Youth: Violence, Conflicts, Memories and Peace Construction Processes"]. *Universitas*, *25*(14), 91-95. https://doi.org/10.17163/uni.n25.%25x

Journal article (more than six authors): Smith, S.W., Smith, S.L. Pieper, K.M., Yoo, J.H., Ferrys, A.L., Downs, E.,... Bowden, B. (2006). Altruism on American Television: Examining the Amount of, and Context Surronding. Acts of Helping and Sharing. *Journal of Communication*, *56*(4), 707-727. https://doi.org/10.1111/j.1460-2466.2006.00316.x

Journal article (with no DOI). Rodríguez, A. (2007). Desde la promoción de salud mental hacia la promoción de salud: La concepción de lo comunitario en la implementación de proyectos sociales. *Alteridad*, *2*(1), 28-40. (https://goo.gl/zDb3Me) (2017-01-29).

Books and chapters of books

Complete books: Cuéllar, J.C., & Moncada-Paredes, M.C. (2014). *El peso de la deuda externa ecuatoriana*. Quito: Abya-Yala.

Chapters of a book: Zambrano-Quiñones, D. (2015). *El ecoturismo comunitario en Manglaralto y Colonche*. En V.H. Torres (Ed.), Alternativas de Vida: Trece experiencias de desarrollo endógeno en Ecuador (pp. 175-198). Quito: Abya-Yala.

Electronic media

Pérez-Rodríguez, M.A., Ramírez, A., & García-Ruíz, R. (2015). La competencia mediática en educación infantil. Análisis del nivel de desarrollo en España. Universitas Psychologica, 14(2), 619-630. https://doi.org.10.11144/Javeriana.upsy14-2.cmei

All reference that have a DOI (Digital Object Identifier System) must be included in the References (which can be obtained at http://goo.gl/gfruh1). All of the journals and books that do not have a DOI are to appear with a link (to the online version, if available, shortened using Google Shortener: http://goo.gl) and the date of query in said format.

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