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Journal of Business and SMEs

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Presentation of Content

In the first article we present, *Administration and management model of ICT and its impact in the competitive performance of SME in Durango State*, by BARRIOS-VILLEGAS, Jaime Alonso & MOLINA-MOREJÓN, Víctor Manuel, with ascription in the Universidad Autónoma de Coahuila, as next article we present, *Strategies used by SMEs to adapt to Industry 4.0*, by RAMÓN-MOLINA, Diego Gustavo, MAGAÑA-MEDINA, Deneb Elí and AGUILAR-MORALES, Norma, with ascription in the Universidad Juárez Autónoma de Tabasco, as next article we present *Organizational diagnosis in a consulting services company, in Villahermosa Tabasco, for the design of a proposal*, by MOREJÓN-SÁNCHEZ, Juana María, ELISEO-DANTÉS, Hortensia, PÉREZ-PÉREZ, Iris Cristel and PÉREZ-JIMÉNEZ, Pablo, with ascription in the Tecnológico Nacional de México, Campus Villahermosa, as next article we present, *Evaluation of the competitiveness elements in the operating areas of industrial SMES*, by GONZÁLEZ, Nora, GUZMÁN, Alba, ALARCÓN, Nelson and VALDEZ, Dina, with ascription in the Instituto Tecnológico de Sonora.

Content

Article **Journal of Business and SMEs**
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Administration and management model of ICT and its impact in the competitive performance of SME in Durango State

Modelo de administración y gestión de TIC y su impacto en el desempeño competitivo en PyME del Estado de Durango

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Abstract

The aim of the present article is to measure the impact between the administration and management of ICT´s and the impact in the competitive advantage in SME´s in the Durango state, México. The methodological development consisted in two stages: The first was carried out exploratory, developing the research model based in the balanced scorecard proposed by Kaplan & Norton, afterwards was validated through the Delphi method (expert method), in the second stage, the statistical analysis was made with structural equations, using partial least squares, with the software Smart PLS. The statistical analysis was applied to 100 responses of the statistical instrument. The main findings indicate that there is a positive and significant relation between the information, human and organizational capital, and the competitive performance in SME´s; the organizational capital has a positive and significant relation to the human capital; and the human capital has positive and significant relation to the information capital. Four of the hypothesis had positive results, with exception of the relation between the organizational capital and the competitive performance, due to the organizational capital does not receive the due importance from the SME´s in the Durango state.

Small and Medium Enterprises, Information and Communication Technologies, Competitive Performance

Resumen

El presente artículo tiene como objetivo medir el impacto entre la administración y gestión de TIC y el desempeño competitivo de PyME en el estado de Durango, México. El desarrollo metodológico constó de dos etapas: La primera se realizó de manera exploratoria, elaborando el modelo de investigación con base en el cuadro de mando integral propuesto por Kaplan & Norton, posteriormente validado mediante el método Delphi (método experto), en la segunda etapa se realizó un análisis estadístico mediante ecuaciones estructurales, utilizando mínimos cuadrados parciales, mediante el software Smart PLS. El análisis estadístico se aplicó 100 respuestas del instrumento estadístico. Los principales hallazgos indican que existe una relación positiva y significativa el capital de la información, humano organizacional y el desempeño competitivo de las PyME; el capital organizacional tiene una relación positiva y significativa sobre el capital humano; y que el capital humano tiene una relación positiva y significativa sobre el capital de la información. Cuatro de las hipótesis planteadas resultaron positivas, con excepción de la relación entre el capital organizacional y el desempeño competitivo, ya que no se le está dando la debida importancia al capital organizacional por parte de las PyME en el estado de Durango.

Pequeñas y Medianas Empresas, Tecnologías de la Información y Comunicaciones, Desempeño Competitivo

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Introduction

Today's society, immersed in the era of knowledge, is marked by a technological revolution (Castells, 2003, p. 7), the fourth industrial revolution through industry 4.0, the Internet of things and e-government have led to a rapid change in the competitive business environment, in which the different sectors of the economy interrelate.

For their part, SMEs are a transcendent link in the economy of a country, facilitating job creation, adaptation to customer needs and innovation (Fonseca, 2013), unfortunately the owners and shareholders of SMEs consider that the The cost of investing in ICT is very high and that the benefits will be reflected in the long term (Saavedra and Tapia, 2013), and that the cost of acquisition, as well as the maintenance of hardware and software is high (Cholán & Cano, 2016). That is why this research work is aimed at the owners and shareholders of companies, particularly SMEs, consider the use of ICT as a support in knowledge management, so that they can obtain better economic results and before Your clients; integrating an ICT environment with human capital and organizational capital in search of expanding its competitive advantage (Valdez & Pérez, 2017). The digital economy is innovating due to the rise of digital technologies and digital marketing, being part of a digital economy allows access to international markets, which makes it possible to explore new markets, have a broader field of action, based on the use of appropriate technology; which becomes more accessible every day, the implementation of ICT in SMEs strengthens competitiveness through social media strategies in a digital marketing strategy, which plays a relevant role in relation to economic performance (Oh, Roumani, Nwankpa, & Hu, 2016), through the use of software for customer relationship management (CRM) or enterprise resource management software (ERM), which is a leading factor in business performance (Wang & Gon 2017).

Framework

This research work is based on the Balanced Scorecard published by (Kaplan & Norton, 2004), using the learning and growth perspective to generate a model that aligns the factors:

Information capital, human capital and organizational capital; in such a way that it is possible to optimize business competitive performance.

The use of ICT in everyday life is becoming more common every day, from the use of a cell phone, to the implementation of computer systems that automate our environment such as the use of the Internet of things, or the automation of domestic spaces intelligent with the use of home automation, in the business environment there is a wide range of options available in the market that adapt to the needs and economic capacity of SMEs, the colles range from websites, social networks, marketing tools, applications in the cloud, cybersecurity tools and electronic commerce, among others (Andalucía es Digital, 2016); Furthermore, the use of ICT in the company contributes to promoting innovation, reducing costs and supplies, opening new distribution channels on a global scale and having more efficient processes (Patiño, 2012).

However, to carry out a correct management of ICT in the company it is necessary that its use be part of a technological planning, included in the business strategic planning, in search of a company being more competitive and profitable (Solleiro & Castañón, 2005), companies that carry out a technological escalation are capable of making their organizational, financial and productive capital more efficient; adopting technological changes (Vázquez, 2015). There are external and internal factors that affect innovation and the adoption of ICT (Vargas 2020), so unfortunately some companies see investment in ICT, more as a cost than as an investment, or are unaware of the potential of integrating ICT into their operations, that is why through the planning, management and administration of ICT in the company, it seeks to have an impact on its competitive performance.

The competitive performance of a company is determined through its competitiveness (Osorio, 2016), business competitiveness is obtained by having internal and external factors to obtain a greater benefit from them and thus generate competitive advantages, these aspects can be empower through the use of ICT, integrating business processes with the industrial structure and those with external market factors (Scheel, 2005).

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The companies that have their capacities supported by externally oriented ICT, have a greater probability of providing a competitive advantage in contexts of low dynamism (Neirotti & Raguseo, 2016), for their part (Cao & Dowlatshahi, 2005) state that ICT have a positive influence on business performance, despite the fact that SMEs do not yet recognize investment in ICT as a factor of competitiveness (Fonseca, 2013), so it seeks to encourage its planning and adoption as a tool for managing and controlling the business capital, in search of increasing profitability through quality of service, giving feedback through sales support (Bracamontes, Azpeitia, Tapia, & Rivera, 2018).

The second construct of the model is human capital, the authors (Estrada & Dutrénit, 2007) express human capital, through tacit and individual learning variables, which shows a predominance over other types of capital and which exerts an influence positive on almost all innovative objectives; for their part (Tapia, & Luna, 2009) define human capital as the set of productive capacities that an individual acquires by accumulating general or specific knowledge. The level of integration between human resources and business strategy is significant and strong when senior management considers human resources as a strategic resource (Azhdar, Farhad & John, 2004).

The third construct of the model is organizational capital, which contributes to the achievement of a competitive advantage, through organizational attributes, such as financial access, operational efficiency, cost structures, personnel skills, supported by quality strategies and customer service and innovation (Suárez & Martín, 2006), organizational capital makes the difference in intangible elements, such as the acquisition of knowledge, communication and decision-making, staff motivation, innovation initiatives and in the development of competitive advantages (Tapia & Luna, 2009).

The fourth construct of the model is competitive performance, which is obtained in a sustained manner, through the implementation of strategies that exploit internal business strengths, through responses to opportunities provided by the environment, neutralizing external threats and avoiding internal weaknesses (Hit, Turk, Hoskisson, Baysinger & Mc Williams, 1991), it is important to consider that the level of quality of products or services is linked to the previous expectations and perceptions of users (Gómez, Ruiz, González & Rosas, 2019) . The competitive advantage of a company is based on being creative and entrepreneurial, generating value in its resources in ways that other companies cannot anticipate (Barney, 2001), by integrating competitiveness and business strategy, competitive advantages emphasize the way in which A company develops the ability to manage intangible resources, such as knowledge and experience (know how) in the production and commercialization of its goods and services, in search of obtaining an advantage over its competitors (Heredia, Ruíz & Castillo, 2018).

Methodology

The methodology of this research work is based on (Hernández, 2014), the research philosophy is positivism, it is an exploratory-correlational type of research, with a deductive research approach, the research strategy is the theoretical and empirical confrontation on a transversal time horizon; which consisted of two phases: 1) Qualitative stage, in which a robust theoretical support was investigated about the issues to be addressed, through the literature review, five constructs were proposed, and 19 variables were selected; As a result of this, the conceptual research model was elaborated in the Atlas TI software, and later the theoretical research model, which is shown in Figure 1, and contains five hypothetical relationships between constructs, in an ICT management environment.

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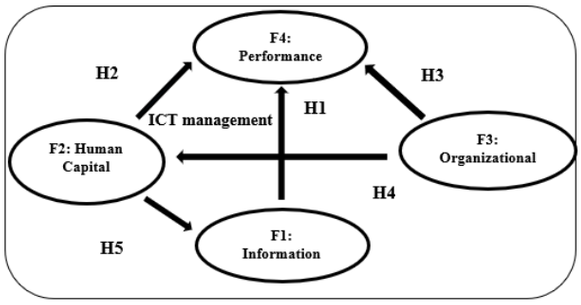

Figure 1 Proposed theoretical model
Source: Own elaboration based on (Kaplan & Norton, 2004)

2) Quantitative stage, in which, as a first step, the proposed model was validated using the expert method (Delphi), initially summoning 30 experts in the areas of ICT and Administration from different educational institutions, of which 27 complied with the argumentation coefficients (Ka), knowledge (Kc) and competence (K) (Landeta, 1999; Gordon, 1994). Once the model was validated, three variables were eliminated at the discretion of the 27 selected experts, subtracting a total of 19 variables at the end of this stage.

Population object of study and data collection

Through the sampling obtained in the National Statistical Directory of Economic Units of INEGI, 2341 economic units were located with the characteristics of SMEs in Mexico, which includes from 11 to 250 workers (Cámara de Diputados, 2002), located in the state of Durango ; excluding those of legislative, governmental and justice administration activities. Table 1 shows the population under study of the research.

Geographic coverage	Durango, Mexico
Total universe	2341
Study population	SMEs affiliated to CANACO, CANACINTRA, COPARMEX and the Council of Young Entrepreneurs
Sample calculation method	Simple random with finite population
Sample size	100 companies
Sample error	± 10.0%
Confidence level	95%
Data collection period	November 2019 to March 2020

Table 1 Study population
Source: Self made

To determine the sample size, a simple random one with a finite population was used, where: N = 2341; Z = 95%; p = 0.5; q = 0.95; e = 0.1; Therefore, the result of the calculation for the sample size was 96 companies, carrying out the study with 100 samples.

The data collection was carried out in situ, carrying a mobile device for the response of the statistical instrument, and digitally through email and WhatsApp; It is worth mentioning that 100% of the responses were obtained through a digital form prepared in Google Forms, which were contacted personally and through the business chambers CANACO, CANACINTRA, COPARMEX and the Council of Young Entrepreneurs of the State of Durango. Initially, a pilot test was applied, which consisted of 55 surveys in order to make inferences and correct interpretations when applying the instrument (Martín, 2004). The reliability of the pilot test of the instrument was analyzed with the IBM SPSS V. 25 software, obtaining a Cronbach's Alpha = 0.900, so the instrument is reliable (Nunnally & Bernstein, 1994), the KMO indices = 0.794 and Bartlett = 0.000; indicate that the matrix does not correspond to an identity, therefore, the factor items are related, which shows that the factorial model is adequate to explain the data (Suárez, 2007) (Fernández, 2011). Once the pilot test was validated, the population sample was completed, applying a number of 169 surveys, of which 69 were not in the range of SMEs, the survey of the population sample of 100 companies was answered by 76 men and 24 women; managers, owners or directors of SMEs.

The questionnaire included a series of multiple-choice questions corresponding to the factors and items of the model, established using the Lickert scale, which is a scale of apparently equal intervals, belongs to what has been called ordinal scale and uses series of items or statements on which a response is obtained from the subject (Ospina, Sandoval, Aristizábal & Ramírez, 2005), for the scale values 1 was considered as the minimum value and 5 as the maximum value.

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Instrument validation

For the modeling of the theoretical model in the Smart PLS software, structural equations have been used, with an approach based on the analysis of variance. Structural equation models are considered among the most powerful tools to study causal relationships through non-experimental data, they are considered a combination of factor analysis and multiple regression, they consist of two components: Measurement model and structural model (Medrano, & Muñoz, 2017). Additionally, structural equation models using partial least squares is a useful statistical instrument for modeling structural equations that social science researchers can consider when searching for behaviors (Cepeda, Nitzl, & Roldán, 2018), to develop the model Theoretical, multivariate analysis includes the application of statistical methods, which simultaneously analyze multiple variables (Hair, Hult, Ringle & Sarstedt, 2017). Previous research and works on the subject have been reviewed during the quantitative stage of the research, to give strong support to the elaboration of the constructs, as well as their latent variables, through the analysis of concepts and their respective relationships.

Once the theoretical framework was structured, the conceptual data were validated, in order to apply a confirmatory analysis of the hypotheses raised, PLS is increasingly used among the research community, when studying social sciences and market studies (Martínez & Fierro, 2018); since it is possible to determine the degree of relationship between variables.

Regarding the sample size and the existing relationships in the structural model, the proposed model has five causal relationships, corresponding to the five hypotheses raised (Marcoulides & Saunders, 2006), for this type of studies the recommendation for sample size is of 70 observations. For its part, (Hoyle, 1995) recommends a sample size of 100 to 200 observations, to potentiate the statistical levels, this aspect is fulfilled, since it was obtained with a sample of 100 valid responses from the statistical instrument.

Reflective Measurement Model

In order to obtain a reliable model, by analyzing the reliability results; as well as the criteria of convergent and discriminant validity of the indicators, it was determined that six variables did not meet the consistency requirements of the model. To determine the reliability of each construct, and the consistency of their respective indicators, the factorial loads or weights were analyzed by running the Smart PLS and Bootstraping algorithm, with a maximum of 5000 iterations, for the interpretation of the results (Carmines & Zeller, 1979) consider values greater than 0.707 as adequate, for their part (Bagozzy & Yi, 1998) consider a value of 0.6 for an exploratory study as acceptable. Based on (Hair, Ringle & Sarstedt, 2011), who propose that the indicators with factor loadings between 0.4 and 0.7 should be considered to eliminate from the model, in order to increase the composite reliability, six variables were eliminated in order not to lose the meaning of the construct (Hair, Hult, Ringle & Sarstedt, 2017), which were (CH1, CI1, CI3, CI4, CO5 and DC1). Figure 2 shows the final version of the model in the Smart PLS Software, which met the criteria of reliability, convergent and discriminant validity (Ibid.), The values in parentheses correspond to the T-statistic value, which must be higher to 1.96 (Wong, 2019, p. 37), to consider a high significance of the factorial load ($p < 0.05$); With respect to the values in the arrows of the internal model, they correspond to the value of the path coefficient (Path) for the endogenous variables, which manifest the hypothetical relationships proposed and must have a value greater than 0.2 to be considered significant (Chin , 1998).

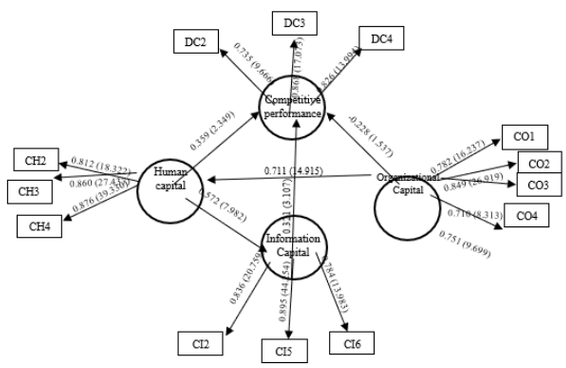

Figure 2 Path model (Path)
Source: Own elaboration, from results obtained from Smart PLS 3 Software

Convergent validity test

Next, Table 2 shows the reliability values, convergent validity and internal consistency of the model indicators, which represents that a set of variables represents a single construct (Henseler, Ringle & Sinkovics, 2009). These values comply with what is proposed by (Hair, Hult, Ringle & Sarstedt, 2017), which corroborates the correct reliability parameters of the model.

Latent variable	Item or Indicator	Factorial Loads> 0.7	Convergent validity Indicator Reliability> 0.5	AVE > 0.5	Internal consistency Composite Reliability 0.7-0.9	Cronbach's alpha 0.7-0.9
Competitive performance	Image of the company and its products (brand)	0.735	0.540	0.659	0.852	0.738
	Productivity	0.868	0.753			
	Business profitability	0.826	0.682			
Human capital	Staff training	0.812	0.659	0.722	0.886	0.807
	Interpersonal and business skills	0.860	0.739			
	Leadership competencies	0.876	0.767			
Organizational Capital	Innovation strategies	0.782	0.611	0.600	0.857	0.777
	Quick adaptation to market needs	0.849	0.720			
	Learning environments	0.710	0.504			
	Knowledge management and transmission	0.751	0.564			
Information Capital	Technological planning	0.836	0.698	0.705	0.877	0.789
	Acquisition, assimilation and development of technology	0.895	0.801			
	Electronic commerce	0.784	0.614			

Table 2 Indicator Reliability and Composite Reliability
Source: Own elaboration based on (Hair, Hult, Ringle & Sarstedt, 2017), using data obtained from Smart PLS 3 Software

Discriminant validity test

Through statistical analysis, the discriminant validity of the model was corroborated, in order to determine to what extent a construct is different from the other constructs of the model (Martínez & Fierro, 2018).

Fornell-Larcker criterion

The first discriminant validity test was performed using the Fornell-Larcker criterion, which is based on the amount of variance captured by a construct with respect to its indicators (Martínez & Fierro, 2018), and which must be greater than the shared with other constructs. The Fornell-Larcker criterion establishes that the square root of the AVE of each construct must be greater than the correlation with any other construct, the required values were met satisfactorily, as shown in Table 3.

Constructs	Human capital	Organizational Capital	Information Capital	Competitive performance
Human capital	0.850			
Organizational Capital	0.711	0.775		
Information Capital	0.572	0.454	0.839	
Competitive performance	0.381	0.173	0.423	0.812

Table 3 Discriminant Validity (Fornell-Larcker)
Source: Own elaboration from results obtained from Smart PLS 3 Software

Cross factorial loads

The analysis of crossed factorial loads was located in the parameters established with the criterion of (Barclay, Higgins & Thompson, 1995), where the factorial loads of a construct must have a higher value for their own variable, compared to the loads of the variables of the other constructs evaluated in the model. Table 4 shows the results of the model's cross factorial loads.

Variables	Construct			
	Human capital	Organizational Capital	Information Capital	Competitive performance
Staff training	0.812	0.627	0.489	0.148
Interpersonal and business skills	0.860	0.549	0.474	0.479
Leadership competencies	0.876	0.639	0.496	0.332
Technological planning	0.522	0.462	0.836	0.365
Acquisition, assimilation and development of technology	0.489	0.387	0.895	0.373
Electronic commerce	0.422	0.278	0.784	0.324
Innovation strategies	0.527	0.782	0.218	-0.014
Quick adaptation to market needs	0.589	0.849	0.332	0.105
Learning environments	0.484	0.710	0.353	0.206
Knowledge management and transmission	0.590	0.751	0.477	0.222
Image of the company and its products (brand)	0.270	0.160	0.397	0.735
Productivity	0.369	0.184	0.341	0.868
Business profitability	0.282	0.071	0.288	0.826

Table 4 Cross Factor Loads
Source: Own elaboration from results obtained from Smart PLS 3 Software

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HTMT ratio

The last discriminant validity test applied to the model was using the HTMT Ratio, whose values must be below 1 (Gold, Malhotra & Sesgars, 2001). In order to detect the lack of validity, it must be identified that the correlations that measure the same construct, which must be greater than the correlations that measure different constructs (Henseler, Ringle & Sartedt, 2016). The results obtained showed the validity using the HTMT Ratio, as shown in Table 5.

Constructs	Human capital	Organizational Capital	Information Capital	Competitive performance
Human capital				
Organizational Capital	0.895			
Information Capital	0.714	0.563		
Competitive performance	0.485	0.250	0.552	

Table 5 HTMT ratio
Source: Own elaboration from results obtained from Smart PLS 3 Software

Collinearity statistic and t statistic

The next action carried out was to corroborate that the variables of each construct did not present collinearity (VIF), considering the criterion of (Hair, Hult, Ringle & Sarstedt, 2017), the results obtained show that the variables of the constructs did not present collinearity (3.3 > VIF> 0.2), as shown in Table 6. Regarding the values obtained for the statistical T of the exogenous variables, they show that the internal model is significant, due to the fact that it has values much higher than 1.96 (Wong, 2013) , which is fulfilled in the model when carrying out a bootstraping or resampling process, as shown in Table 6.

Construct	Variables	Collinearity Statistics 3.3> VIF> 0.2	Statistical T => 1.96
Human capital	Staff training	1.579	18.407
	Interpersonal and business skills	1.857	28.021
	Leadership competencies	1.964	38.169
Information Capital	Technological planning	1.685	21.119
	Acquisition, assimilation and development of technology	2.186	43.153
	Electronic commerce	1.588	14.297
Organizational Capital	Innovation strategies	2.024	16.304
	Quick adaptation to market needs	2.285	26.912
	Learning environments	1.344	8.294
	Knowledge management and transmission	1.384	9.962
Competitive performance	Image of the company and its products (brand)	1.237	9.168
	Productivity	1.934	17.791
	Business profitability	1.823	13.613

Table 6 Collinearity statistic (VIF) and T statistic
Source: Own elaboration from results obtained from Smart PLS 3 Software

Significance of the structural model

To analyze the standardized Path coefficients of the structural model, a bootstraping or resampling process was performed. The values of the Path coefficients vary between -1 and +1, and as the result increases, the hypothesis will have a higher prediction among the analyzed constructs; On the contrary, the lower the value, the hypothesis will have less convergence, if the Path coefficient presents an opposite sign to the proposed hypothesis, the hypothesis will not be valid (Martínez, & Fierro, 2018).

In order to check the hypotheses raised for the research model, and determine their affirmation or rejection, as well as their respective implications, the values obtained for the Path coefficients presented four positive signs and one negative sign. The values of R^2 in the endogenous variables of 0.25, 0.50, and 0.75; They are considered to have a weak, moderate and substantial significance (Hair, Ringle & Sarstedt, 2011), so once the values for the Path coefficients were analyzed, four positive relationships greater than 0.2 were obtained; which were CI → DC = 0.321, CH → DC = 0.359, CO → CH = 0.711, CH → CI = 0.572; manifesting feasible relationships between the constructs, so these hypotheses are validated. Regarding the relationship CO → DC = -0.228, a negative sign was obtained, with a value p = 0.27; Therefore, it does not appear viable and the hypothesis is rejected, the values of the Path coefficients are presented in Table 7.

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Predictive validity of the structural model

To consider the predictive validity of the model, f² was used, which shows that both an exogenous latent variable contributes to the R² value of an endogenous latent variable (Wong, 2019, p. 38), the authors (Hair, Hult, Ringle & Sarstedt, 2017) establish the prediction effect values of f² = 0.02 (small), 0.15 (medium) and 0.35 (large), so based on the values obtained for f², the following prediction effects are established : CI → small DC, CH → small DC, CO → CH large, CH → large CI; Regarding the effect of CO → DC, it presents a negative value and a value p = 0.127; so its prediction effect is discarded.

Predictive relevance and significance level of the structural model

To corroborate the predictive relevance of the model, the Q² coefficient of Stone-Geisser's Q² (Stone, 1974), and (Geisser, 1974), obtained through the Blindfolding process in Smart PLS, was used, by which predictive relevance is assessed of the structural model (Chin, 1998). The values considered to determine the predictive relevance of the structural model were 0.02 as small, 0.15 as medium, and 0.35 as large values (Hair, Hult, Ringle & Sarstedt, 2017). A large predictive relevance value for Human Capital, a medium predictive relevance value for Information Capital was obtained; and a small predictive relevance value for Competitive Performance, as shown in Table 7, as well as the values of the Path coefficients, from the research model. Figure 3 corresponds to the structural model in Smart PLS, by calculating the coefficients of R².

Construct	Human capital	Information Capital	Competitive performance
Predictive Relevance (Q^2)	0.354	0.217	0.127
Path coefficients	0.506	0.327	0.233

Table 7 Predictive Relevance of Structural Model Constructs Using Stone-Geisser's.
Source: Own elaboration from results obtained from Smart PLS 3 Software.

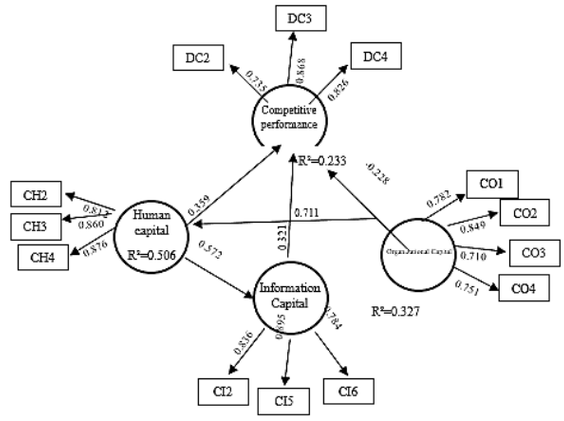

Figure 3 Coefficients of the R² of the Research Model
Source: Own elaboration, from results obtained from Smart PLS 3 Software

The coefficient of R² indicates the amount of variance of a construct that is explained by the predictive variables of the endogenous construct, whose values range between zero and one (Martínez & Fierro, 2018), the higher the value of R², the greater the predictive capacity is presented, (Falk & Miller, 1992) pose a minimum value of R² of 0.10; Chin (1998) considers 0.67, 0.33 and 0.10 as substantial, moderate and weak; while Hair et al. (2017) suggest values of 0.75, 0.50, 0.25 as substantial, moderate and weak. Through the analysis of the coefficient of R², the results suggest that there are three positive and significant relationships, with a moderate significance and are presented below:

– Organizational capital is related to human capital.

– Human capital is related to information capital.

– Human capital, information capital and organizational capital are related to competitive performance.

Therefore, based on the coefficients of R², it is determined that organizational capital explains 50.6% of the variance of human capital, while organizational capital, through human capital, explains 32.7% of the variance of the capital of the Information, on the other hand, human capital, information capital and organizational capital, explain 23.3% of the variance of competitive performance, based on what is established by (Hair, Hult, Ringle & Sarstedt, 2017). Figure 3 shows the statistically significant relationships through the analyzed model.

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Results

In the present research work, five hypotheses were proposed, which were expressed in a theoretical way, for later, by means of structural equations, they were contrasted by means of a statistical analysis. Next, in Table 8, the contrasts of the research hypotheses are shown, which include the factors: Organizational Capital, Human Capital, Information Capital and Competitive Performance. Of the five hypotheses raised, four were accepted, and one was rejected.

Hypothetical relationships	Path coefficients (standardized β)	Student t statistic => 1.96	P value <0.05	Effects (f^2)	Hypothesis contrast
Information Capital → Competitive Performance	0.321	3.111	0.002	0.090	Accepted
Human Capital → Competitive Performance	0.359	2.388	0.017	0.070	Accepted
Organizational Capital → Competitive Performance	-0.228	1.526	0.127	0.033	Rejected
Organizational Capital → Human Capital	0.711	14.997	0.000	1.023	Accepted
Human Capital → Information Capital	0.572	8.000	0.000	0.486	Accepted

Table 8 Path coefficients (standardized regression coefficients)
Source: Own elaboration from results obtained from Smart PLS 3 Software

The statistical analysis using partial least squares shows that there is a positive and significant relationship between information capital and the competitive performance of SMEs in the state of Durango (H1: $\beta = 0.321$; $t = 3.111$; $p = 0.002$; $f^2 = 0.09$), derived from this, it is inferred that the information capital positively influences the competitive performance of the SME in the state of Durango with a small predictive effect, which coincides with the results obtained empirically, so that the SMEs in the state of Durango that invest in the planning, management and use of ICT, have a better competitive performance compared to those that do not make such investment. In a complementary way, there are economic alternatives for digital marketing that replace traditional marketing, promoting making the most of available business technological resources (Lizama, Matos & Beltrán, 2020), in search of a competitive advantage.

In the same way, it is concluded that there is a positive and significant relationship between human capital and the competitive performance of SMEs in the state of Durango (H2: $\beta = 0.359$; $t = 2.388$; $p = 0.017$, $f^2 = 0.07$), with a small predictive effect, which coincides with the results obtained empirically, therefore, SMEs that have trained human resources and that work effectively, will obtain greater profitability. Regarding the impact of organizational capital on competitive performance, the statistical data obtained show that there is no positive and significant relationship in SMEs in the state of Durango ($\beta = -0.228$; $t = 1.526$; $p = 0.127$; $q = 0.033$); which contrasts with the literature review, these results generate an area of opportunity for future lines of research, due to the fact that due importance is not being given to organizational capital by the entrepreneurs that make up SMEs in the state of Durango, opening a gap in areas of opportunity that allow a positive impact on business competitive performance, based on new skills in staff, raising awareness among managers and owners of SMEs, as well as their human capital, regarding the importance of optimizing organizational capital. Likewise, it is concluded that there is a positive and significant relationship between organizational capital and human capital of SMEs in the state of Durango ($\beta = 0.711$; $t = 14.997$; $p = 0.000$; $f^2 = 1.023$), with a large predictive effect ; In this sense, in this sense it is possible to infer that SMEs in the state of Durango that have efficient organizational capital are companies that have organized and efficient human capital. Finally, it is concluded that there is a positive and significant relationship between human capital and the information capital of SMEs in the state of Durango ($\beta = 0.572$; $t = 8.000$; $p = 0.000$; $f^2 = 0.486$), with a predictive effect large, which coincides with the results obtained empirically, in this sense, it is possible to infer that SMEs in the state of Durango that invest time and financial resources in their personnel, will be able to carry out better planning, management and use of ICT, in seeks to obtain a better competitive performance since human development is supported by digital technologies (Gabdullin, 2020). In the same way, if the company has technologies adapted to its capacities and needs, but the development of human and technical resources is scarce, innovation processes and competitive performance will be limited (Romero, 2020), in such a way that the ICT investment will not have served its purpose.

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On the other hand, the current industry demands a skilled and dynamic workforce, otherwise there is the risk of technological unemployment, where the unskilled human resource will be displaced due to automation (Gaxiola, 2020), part of the indirect effects Industry 4.0.

Conclusions

Faced with the highly competitive and changing environment of today's market, companies that have adapted to the circumstances have benefited from their income, which is why SMEs that have acquired, managed or developed technology, and that lead to carry out strategies such as e-commerce and social media marketing; They have a greater adaptation to the current market, disrupted by online and home services, therefore these companies have benefited in their competitive performance compared to companies that do not implement these measures, implementing efficient technological planning supported by strategic planning. business. Consequently, not planning, managing and administering ICT in companies, linked to innovation strategies, will be leading to losing a business competitive advantage in a globalized and fiercely competitive environment, a changing environment, derived from the pandemic caused by the virus SARS-CoV-2 (COVID-19), since companies that have adapted to provide products and services through technological platforms, which have overcome the face-to-face barrier of trade and services, have a huge market niche that is looming long-term, as shown by large digital companies such as Amazon, which expects to close 2020 with an increase in sales (Expansión, 2020), despite the pandemic caused by COVID-19, even small stores that started to perform sales and delivery services via digital applications.

Regarding SMEs that carry out planned actions to train their personnel, implement actions to develop leadership skills and interpersonal and business skills constantly, obtain better results in their competitive performance.

That is why business owners, managers and directors must assess the importance of their human capital, seeking their constant training, not only in matters of their work environment, it is necessary to focus on making staff feel part of the company, human resources committed to the development and business image, all this always trying to be carried out in a friendly and comfortable environment for the worker, seeking human development and the development of leadership, negotiation and problem solving skills of the staff, with the aim that human capital can perform its tasks in an optimal way, given the different circumstances that arise during the performance of their functions.

Organizational capital is a pillar that supports optimal business performance, in relation to competitive performance, the findings of this research show that SMEs in the state of Durango have not dedicated sufficient efforts to optimize their processes, seeking process optimization strategies , either in the accounting, logistics, supply, sales and marketing areas; as well as the development of organizational skills in the staff, seeking a comparative and competitive advantage, considering providing quality and warmth in customer service.

Additionally, it is concluded that SMEs in the state of Durango that carried out various customer service strategies, as well as innovation strategies that quickly adapt to the changing needs of the markets; and that promote learning environments for their human resources, claim to obtain better results in the performance of their human resources, since when human resources are optimally directed, organized and supervised, they are oriented to have a better image towards captive and potential clients , provide a better image of the company, and by fulfilling the personnel with their functions in an efficient and orderly manner, and the business results lead to better competitive performance. Finally, it is pertinent to comment that the implementation of ICT in industry does not always bring benefits to workers, since aspects such as automation have reduced the number of jobs derived from technological unemployment, which is the reason for a different line of research.

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Strategies used by SMEs to adapt to Industry 4.0

Estrategias utilizadas por las PyMEs para adaptarse a la industria 4.0

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Abstract

In the last decade, organizations around the world have acquired a great interest in adapting their processes to an Industry 4.0. The objective of this research is to identify and analyze the strategies implemented by some Latin American and European companies in order to be competitive. The methodology used was a systematic review, with a search for information where databases such as Redalyc, Scielo, Dialnet, CONRICyT and ScienceDirect were included. 17 of 7,945 articles were selected for review, published in a period from 2015 to 2020. As a result, 12 studies carried out in Europe and 5 in Latin America were analyzed, 29% were carried out with a qualitative approach, 23% quantitative, 24% mixed and 24% case studies. The results indicate as strategies, the creation of awareness in i4.0, the generation of laws and regulations that benefit SMEs in this sense, generate cybersecurity schemes, promote research and technological development, and generate alliances with universities. It is concluded that the main recommended strategy is training in the use of technological tools so that they can understand the general panorama and become familiar with their use.

Industry 4.0, SMEs, Strategies

Resumen

En la última década, las organizaciones de casi todo el mundo han adquirido un gran interés por adaptar sus procesos a una industria 4.0. En esta investigación se tiene como objetivo identificar y analizar las estrategias que implementan algunas empresas de América latina y Europa para poder ser competitivas. La metodología utilizada fue una revisión sistemática, con una búsqueda de información donde se incluyeron bases de datos tales como Redalyc, Scielo, Dialnet, CONRICyT y ScienceDirect. Se seleccionaron 17 de 7,945 artículos para su revisión, publicados en un periodo de 2015 a 2020. Como resultado se analizaron 12 trabajos realizados en Europa y 5 en américa latina, el 29% fue realizado con enfoque cualitativo, el 23% cuantitativo, 24% mixto y 24% estudios de caso. Los resultados indican como estrategias, la creación de conciencia en la i4.0, la generación de leyes y normas que beneficien en este sentido a las PyMES, generar esquemas de seguridad cibernética, promover la investigación y desarrollo tecnológico, y generar alianzas con las universidades. Se concluye que la principal estrategia recomendada es la capacitación en el uso de las herramientas tecnológicas para que se logre comprender el panorama en general y se vayan familiarizando con su empleo.

Industria 4.0, PyMEs, Estrategias

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Introduction

The fourth industrial revolution or Industry 4.0 came to drastically revolutionize the way businesses are managed, mainly affecting small and medium-sized companies (SMEs), where it should be noted that it is the growing integration of the economies of the entire world. In the world, only about 10% of Latin American SMEs export part of their production, in Europe the fraction of exporting SMEs amounts to at least 40% of the total (ECLAC, 2019).

On the other hand, the United Nations [UN] (2018) mentions that SMEs generate approximately 60 or 70% of employment in the world and it is for this reason that SMEs are essential in the economic development of a country. The Organization for Economic Cooperation and Development, or as it is well known OECD (2019), issued a publication where it argues that in most of the countries that comprise it, their economies are made up of SMEs but that, unfortunately, even with all those figures and regardless of their contribution to society and the world, they have to fight a great battle especially through their strategies to adapt to new forms of production and marketing of goods and services.

It is for this reason that the main objective of this research is to identify and analyze the strategies implemented by some specific small and medium-sized companies in Latin America and Europe, in order to concentrate them in a single document and see the possibilities that SMEs have of be competitive in this industry 4.0, for this it is necessary to develop some points that are relevant before entering fully into the analysis of these strategies.

Development

Industry 4.0

Throughout history, technological development managed to grow surprisingly and exponentially, all with the aim of improving industrial processes.

Thus, the changes that occurred from this were baptized as "industrial revolutions", something which can be defined as the transformation process that occurs in a period of time in the economic as well as the social part and is generally always accompanied by technology and innovative processes (López, Lovato and Abad, 2018).

The origins of the industrial revolutions that have arisen throughout the world, just to mention some authors such as Diaz (2018); Echeverria and Martínez (2018); López, Lovato and Abad (2018); Martínez, Catache and Huerta (2018) and finally Jacquez-Hernández and López (2018), agree that the so-called Industry 1.0 revolution that includes the end of the 17th century and the beginning of the 18th century (1784 to 1850 approx.), Consisted of look for alternative energies finding in steam a perfect source to mechanize productivity, which gave way to the industrial revolution 2.0 approximately from 1850 to 1920, where mass manufacturing, assembly lines and division of labor originated. From this stage one of its most representative exponents was Mr. Henry Ford, to whom series production is mainly attributed. For 1960, a great leap was made in terms of technology since a stage in which production began to involve bioengineering, robotics, and it was where the term TIC's and the so-called Industrial Revolution 3.0 or Scientific Revolution arose, to give step to the term that is developed, the industrial revolution 4.0 (I4.0) that is accompanied by digital and cyber physical spaces or systems.

I4.0 brings with it a wide range of possibilities such as the internet of things, augmented reality, robotics, automated manufacturing, 3D printing, digitization, just to name a few. However, most of the time, companies and especially SMEs, do not know how to respond, that is, they have the problem of not being able to implement the idea of an I4.0 and have the limited capacity to adapt them to their strategies (Carro, Flores, Flores, Hernández, 2019; Collaborative Environments 2020; Jacquez and López, 2018;).

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Position of SMEs in I4.0

SMEs are currently full of changes and uncertainties, all this as a result of I4.0 to the degree of paying greater attention to certain areas that directly impact to determine their competitive capacity, however, SMEs have to be able to develop all their adaptation capacities and to compete in increasingly extensive, dynamic and demanding markets (López, 2018).

It is clear that the objective of many entrepreneurs when migrating their activities to an automated industry is to dominate their competition and not only reach new markets, that is why in this context it is necessary to consider a hypothesis in which it revolves the present investigation; SMEs are able to compete if they adapt their strategies to an industry 4.0. But before going fully into the subject and answering the hypothesis, it is necessary to explain the context in which they are found, and that is that SMEs, although we regularly identify them as small and medium-sized enterprises, must take into account their legislative concept, and that is that from the moment they register with the SAT in Mexico, they have a series of rights and obligations, as well as the possibility of accessing specific financing channels (Gómez, 2016), which would allow them to implement various growth strategies, among them the migration to an I4.0 scheme.

On the other hand, statistically speaking, small companies are those that have a workforce of less than 50 workers and that their business volume or balance is less than or equal to 10 million pesos, it should be mentioned that this varies according to the country, while that medium-sized companies will have less than 250 workers and a business volume less than or equal to 250 million pesos (Peña and Bastidas, 2004).

As mentioned, SMEs are the engine of countries and to glimpse the panorama according to Romero (2016), countries such as Bulgaria, Czech Republic, Estonia, Croatia, Poland or Slovakia, SMEs contribute more than 50% of employment in the formal sector, while in Argentina it represents 70% of formal employment; in Brazil, 60%; in Chile, 86% and in Mexico, 48%, all these data just to mention a few.

What is clear to us is that poor, rich, powerful countries, all and without any distinction, can be affected by the competitiveness of their SMEs and as already mentioned, in one way or another they are immersed in the fourth industrial revolution, where customers tend to rapidly change their tastes and preferences, spontaneously changing products or services that meet their new requirements, that is why it is necessary for SMEs to be constantly changing and periodically modify their strategies and above all to adapt them to their new environment, that is, they make changes in essential areas such as production, promotion, marketing, and distribution, placing greater emphasis on their finances based on a conceptual scheme of Industry 4.0, with the purpose of keeping their customers and thus prevent them from migrating to the competition (Esteves, 2000).

It is worth mentioning that the adaptation of SMEs to an industry 4.0 is reiterated, not as something of life or death but as a transition process that must begin as soon as possible, since according to a study carried out by Buisán and Valdez (2017) , mentions that 40 out of 100 SMEs in the next 10 years and that are not digitized will end up disappearing.

Methodology

The systematic review work has been carried out through an adaptation of the model proposed by Kitchenham et al. (2010), although initially it was introduced as a methodology applied to computational sciences, it is extremely easy to adapt them to other areas such as this case in social sciences, the present methodology consists of three fundamental steps, which are: planning, execution and results .

Planning

This section describes in detail the different search processes that were carried out and that allowed the compilation of each of the articles that were later presented in this research, it should be noted that everything was carried out in a systematic way, taking the following steps:

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- Determine database: At this stage, the information bases were carefully selected and, due to the recent nature of the subject, five databases were chosen that have reliability, support by the scientific community and credibility, which are, Redalyc, Scielo, Dialnet, Conricyt and ScienceDirect.

- Keywords: for this research, certain keywords were proposed in order to find specific articles which were ("Industry 4.0", "Industry 4.0", "Fourth industrial revolution", "I4.0", "SME in industry 4.0 "," SMEs industry 4.0").

- Search fields: most of the selected databases have "advanced search", which were chosen the same parameters for all, which were, "year of publication", "type of research", "discipline" and "language".

- Inclusion criteria: The criteria classification list was carried out as follows: articles that are from "2015 to 2020", publications that are exclusively "research articles", research that is "quantitative", "qualitative "," Mixed "or" case study ", articles in" English "or" Spanish ", which belong to the discipline of" social sciences ", and finally publications that are exclusively from" Latin America "and" Europe".

- Exclusion criteria: articles whose publication year is less than 2015, all publications that are not scientific articles will also be omitted, such as book chapters, books, papers, etc., research articles whose methodology does not is the one mentioned above and finally, languages other than Spanish and English will not be accepted, for example, Portuguese, Mandarin, etc., since it should be noted that articles from other continents other than those mentioned above will not be accepted even if they contain valuable information.

Execution

In this stage of the process we undertake the task of locating the articles that will contribute to the results of this research, once entering the databases of Redalyc, Scielo, Dialnet, Conricyt and ScienceDirect, we enter the inclusion and exclusion parameters as required. which gives us a figure of Redalyc with 3225, Dialnet with 770, Scielo with 1200, ScienceDirect 2550 and Conricyt 500, which were rigorously reviewed and filtered by country of application since it should be remembered that only research that has been done would be studied In Latin America and Europe, Redalyc 35, Dailanet 20, Scielo 25, Conricyt 15 and ScienceDirect 50 remained as a result, resulting in 145 articles that were subsequently removed 4 articles that were repeated and two more to be filtered in Portuguese, finally analyzing the 139 publications that were analyzed in detail, to which a criterion of specificity of results was added, where there were 17 articles that contributed They were directly related to the results of this research, leaving Redalyc with 1, Dialnet 6, Scielo 2, Conricyt 0 and ScienceDirect 8, the process mentioned here is represented in Figure 1.

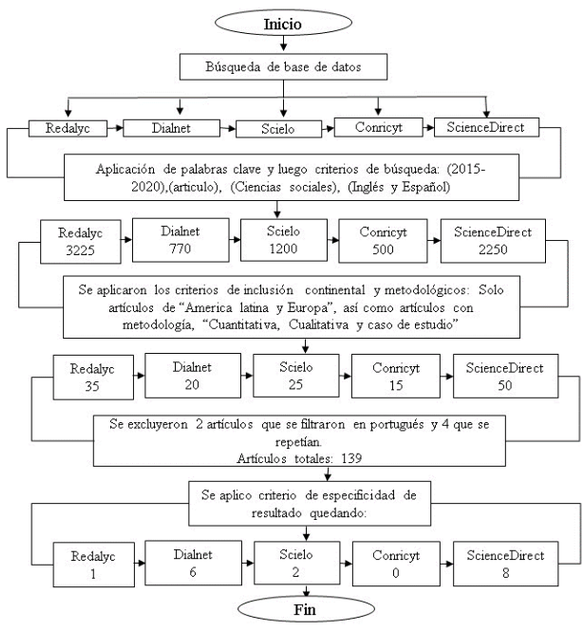

Figure 1 Search process
Note: Own elaboration based on Martínez-Usoralde, Gil-Salom and Macías-Mendoza (2020).

Results

The following section presents the results of the 17 publications that met each of the inclusion criteria, then a table with general data of the selected articles is shown.

No.	Title	Author (s)
A1	A Qualitative Study on Industry 4.0 Competitiveness in Turkey Using Porter Diamond Model	Erboz (2020)
A2	The Italian experience in implementing Industry4.0	Gaddi
A3	Digital Transformation of Industry 4.0	Garibaldo and Garbellini (2020)
A4	Peruvian technological mipymes to 2030. Strategies for their insertion into industry 4.0	Sampietro-Saquicela (2020)
A5	Reflections on Industry 4.0 from the Basque case	Gutarra yValente (2018)
A6	Three-stage maturity model in SMEs towards Industry 4.0	Navarro and Sabalza (2016)
A7	Business strategies in family SMEs in northern Mexico	Ganzarain and Errasti (2016)
A8	The impact of the fourth industrial revolution on the social and productive relations of the plastic industry Implastic S. A. In guayaquil-ecuador: challenges and perspectives	Sánchez, Hernández and Zerón (2017)
A9	Towards Industry 4.0: a SWOT-based analysis for companies located in the Sorocaba Metropolitan Region (São Paulo State, Brazil)	López, Lovato and Abad (2018)
A10	Industry 4.0 technology implementation in SMEs and A survey in the Danish-German border region	Silveira, Perles, Veiga, Azevedo, Lopes (2020)
A11	An empirical evaluation of industry 4.0 applications of companies in Turkey: The case of a developing country	Yu and Schweisfurth (2020)
A12	Industry 4.0 Adoption challenges and bene fi ts for SMEs	Yüksel (2020)
A13	A Strategic Model to take the First Step Towards Industry 4.0 in SMEs	Masood and Sonntag (2020)
A14	Measures for a successful digital transformation of SMEs	Pinto, Silva, Costa, Campilho, and Pereira. (2019)
A15	Getting Small Medium Enterprises started on Industry 4.0 using retrofitting solutions	Volker Stich, Violett Zeller, Jan Hicking, Andreas Kraut (2020)
A16	A Survey on Digitalization for SMEs in Brandenburg, Germany	Niemeyer, Gehrke, Müller, Küsters, and Gries (2020)
A17	Digitalization, business models, and SMEs: How do business model innovation practices improve performance of digitalizing SMEs?	Kilimis, Zou, Lehmann and Berge (2019)

Table 1 General data
Source: Own elaboration

The selected articles were studied in detail, resulting in some of the following statistics.

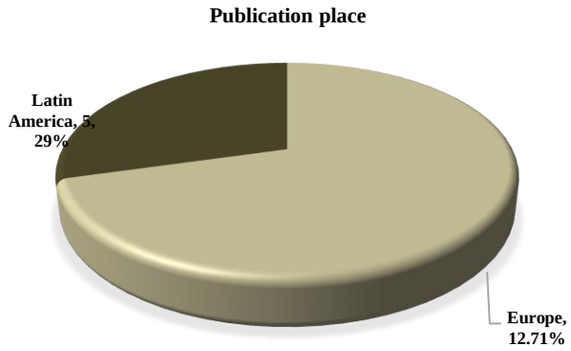

Figure 2 Publication place

In the methodology section, the inclusion parameters that were taken to determine the articles were shown and one of them was the place of publication taking only Latin America and Europe as a reference, resulting in that most of the works and for To be precise, 71% occur in Europe, in other words, Europeans are the ones who propose a large number of strategies to support SMEs, unlike Latin America, which barely reaches 29%.

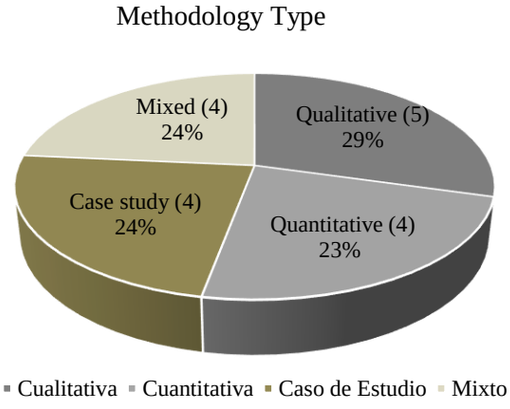

Figure 3 Types of methodology

In Figure 3, four different types of methodology are displayed which will be analyzed from the highest to the lowest, starting with the qualitative ones, which had 5 publications, reaching 29% where Erboz (2020) participates, where 14 were made Semi-structured interviews and managers of companies with more than 50 employees were interviewed, the investigation took 1 years to be carried out and finally the interview is divided into three parts: activities of the company, industry 4.0 and the competitiveness model.

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Gaddi, Garibaldo and Garbellini (2020), with the help of the Italian government, conducted an interview with 30 Medium companies, where they interviewed managers, as well as partial samples of workers and delegates, their interview was divided into two parts: the smart factory and smart products, the investigation took a time of 2 years to carry out. Sampietro-Saquicela (2020), carried out a focus group with 100 companies, which were divided into two groups where there were medium-sized and small companies, the topics discussed were industry 4.0, automation and intelligent products, attended by managers or directors of their respective company, the work took 6 months to complete; Ganzarain and Errasti (2016), carried out an investigation lasting 1 year and 3 months, where they used a semi-structured interview with 43 managers of Spanish companies and the topics addressed were automation, maturity models and industry 4.0. Niemeyer, Gehrke, Müller, Küsters and Gries (2020), also held focus groups with owners, supervisors or managers of small or medium-sized companies, where they addressed the topics of the internet of things, sensors and automation.

Regarding the quantitative studies, which, like the qualitative ones, had 29%, authors such as Sánchez, Hernández and Zerón (2017) stand out, where the data collection was a questionnaire with a Likert scale that was applied in Ciudad Victoria and Tamaulipas, with a sample of 84 and 106 respectively, For their part, Yu and Schweisfurth (2020), collected information through a questionnaire, contacted 4669 SMEs from Germany and Denmark, of which only 669 decided to participate, which were sent by mail. Yüksel (2020), carried out and validated a questionnaire with a five-point Likert scale, which was sent to 1000 small and medium-sized companies in Turkey, whose objective was to compile the implementation processes of industry 4.0. Masood and Sonntag (2020), evaluated the challenges and benefits of industry 4.0, carried out a specific questionnaire for SMEs in the United Kingdom, the purpose of which was to collect information on the technology they used to propose strategies.

Finally, Bouwman, Nikou and De Reuver (2019), conducted a survey only to SMEs that had technology or at least used big data, therefore the questionnaire began by asking what technology they applied and if the filter did not pass, it was discarded, applied exclusively to managers, the questionnaire was translated into 11 languages as it was applied in 11 countries and finally the data was collected since 2017.

On the other hand, the works with mixed methodologies reached 24%, among which are the authors Gutarra and Valente (2018), this research was divided into two parts, the first a survey of 277 companies to determine the relevant variables of the Industry 4.0 and subsequently a semi-structured interview was conducted with 9 experts from two different countries on the variables that were relevant. Silveira, Perles, Veiga, Azevedo and Lopes, (2020), carried out a focus group as a preliminary phase to collect data from experts on the subject of industries 4.0, to then compare with the literature, which allowed them to elaborate a questionnaire which was applied to 227 medium and small companies in Sau Paulo Brazil. Pinto, Silva, Costa, Campilho, Pereira. (2019), divide their work into two phases, the first a questionnaire where it served to collect information on automation, internet of things, production and processes and ERP interface, which they applied to medium-sized companies with a sample of 350, to later focus on a single company as a case study which was divided into 8 phases: process study, decompose processes into simple tasks, system compatibility, income evaluation, implementation, improvement evaluation , evolution and evolution of processes. Navarro and Sabalza (2016), conducted a questionnaire to determine which companies were in the process or interested in Industry 4.0, with which they subsequently conducted 25 in-depth interviews with managers, directors or owners of SMEs.

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Regarding the methodology, the case studies were also analyzed, the methodology with the lowest percentage of publications. On this study method, López, Lovato and Abad (2018), developed the case of the company Inplastic SA with a history of more than 25 years which has become a medium-sized company in Ecuador, and the purpose of the study was the determination of the processes that can be improved with industry 4.0 with a vision for 2030, proposing at the end a series of strategies to implement.

Stich, Zeller, Hicking and Kraut (2020), studied 11 different cases of companies with employees less than 250, among which manufacturing and production stand out, all this in order to obtain a valid and proven maturity model, the process was documented and evaluated by external evaluators. The study developed by Kilimis, Zou, Lehmann, Berge (2019), tried to explain the lag suffered by small and medium-sized companies, which is why they focused on 12 companies whose names remained anonymous, detailing the benefits they would have if they migrated to an industry 4.0

In Table 2, the strategies found, proposed and used by the different authors mentioned above will be presented in synthesis form to conclude with a brief explanation of them and give way to the discussion and conclusion.

No.	Author (s)	Strategy (s)
A1	Erboz (2020)	– Employee training on the industry 4.o. – Elaboration of a strictly detailed roadmap and invest in ID.
A2	Gaddi, Garibaldo y Garbellini (2020)	– Training for SME owners to understand I4.0 – Approach with the government for credit support – Alliance of SMEs between different countries, – Eliminate worthless activities that can be performed automatically and automate them with technologies
A3	Sampietro-Saquicela (2020)	– Warehouse automation. – Investment in smart machines. – vertical and horizontal integration through Tic's
A4	Gutarra y Valente (2018)	– Establish a culture of entrepreneurship based on technologies – Seek help from the government to promote regulations that encourage SMEs to use technology in their processes.
A5	Navarro y Sabalza (2016)	– Basque industry 4.0 strategy: staff training, – KET Strategy: Key Enabling Technologies which refers to investing in ID, – Long-term machine cost reduction
A6	Ganzarain y Errasti (2016)	– Diversification to products with technology – Create a roadmap
A7	Sánchez, Hernández y Zerón (2017)	– Diversification to products with technology – Create a roadmap
A8	López, Lovato y Abad Peña (2018)	– Technological renewal of machinery every certain time – Incorporate the internet of things to carry out more efficient processes – Conduct market research incorporating big data, – Control in real time the entire production system through ERP or SAP – Staff training.
A9	Silveira, Perles, Veiga, Azevedo y Lopes (2020)	– Make alliances with universities to incorporate new human talent and train them in an industry 4.0 – Partnerships with companies to obtain software or licenses, – Seek alliance with companies from advanced countries.
A10	Yu y Schweisfurth (2020)	Of the companies that investigated none showed interest in adopting an industry 4.0, for which they propose: – Implement training for SMEs so that they understand the benefits of I4.0
A11	Yüksel (2020)	– Implement credits for the acquisition of machinery
A12	Masood y Sonntag (2020)	– Introduce technology as possible, leaving a budget for your purchase
A13	Pinto, Silva, Costa, Campilho y Pereira (2019)	– Reorganize SMEs – Detect repetitive activities and automate it in order to reduce cost in the long term, Assign a budget for the purchase of machinery, implementation of big data or cyber physical systems

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No.	Author (s)	Strategy (s)
A14	Stich, Zeller, Hicking y Kraut (2020)	– Implementation of ERP or SAP to supply chains and thus have information in real time, Introduce the internet of things
A15	Niemeyer, Gehrke, Müller, Küsters y Gries (2020)	– Training of staff of new tools, – Sensor introduction
A16	Kilimis, Zou y Ulrich (2019)	– Raise awareness of an organizational culture towards Industry 4.0 – Start using ERP systems to plan activities and reduce costs.
A17	Bouwman, Nikou y Mark (2019)	– Apply a maturity model in SMEs to determine if they are ready to enter an industry 4.0 and if they are not, adapt their organization and then begin to incorporate technology, cyber physical tools, the Internet of things or work in the cloud.

Table 2 Synthesis of strategies found
Source: Own elaboration

It is necessary to clarify that each of the strategies presented in Table 2 are those that are already being implemented or beginning to be used, therefore they are not generalized, as is the case in Spain or Italy where the government supports SMEs since they are, as mentioned previously, the backbone of its economy, and therefore create support for them. Another important point is ERP or SAP, which are systems that control, plan and manage information in real time, especially in the production area, which is aimed at medium-sized companies (Stich, Zeller, Hicking and Kraut, 2020). On the other hand, although some of the strategies can become risky or expensive, such as requesting a loan, acquiring machinery, diversifying the product or investing in research and development, it is necessary that SMEs carry out a prior evaluation of the organization to determine if it is prudent to take the step, as Bouwman, Nikou and De Reuver (2019) point out.

Conclusion

As a conclusion, it can be said that the objective of this research was fulfilled, which was to identify and analyze the strategies implemented by some companies in Latin America and Europe in order to be competitive and as a result we obtained 17 jobs where 12 were from Europe and 5 from America Latin America where something really interesting happens since in European SMEs you can see the support from the government, such as the strategy promoted by the government of Spain called "Connected Industry 4.0", in which they provide endless SMEs tools and programs so that they can implement in their businesses and together face this new era (Buisán and Valdez, 2017), meanwhile in Latin America, the country of Argentina is the one that makes the largest investment in technology, even though 76% of people believe that Industry 4.0 is an enemy and not an ally since they think that most of the jobs will be displaced by new technologies, following gone through Mexico and lastly Peru (Sampietro-Saquicela, 2020).

However, despite the fact that Latin America has low automation rates compared to Europe, SMEs from both continents need all the necessary support, so Braña (2020) mentions some strategies that countries could implement in order to develop the potential of business and thus migrate to an industry 4.0, a) create awareness of i4.9, b) establish financial incentives, c) create laws and regulations that benefit SMEs, d) take care of cyber security, e) promote ID f) alliances with universities to develop new human talents.

What, if it is a fact, is an opportunity that very few understand that it can enhance their company in the long term, since it is a gradual process, and therefore some authors propose as an initial strategy a training of the benefits and management of new technological tools so that they can understand the general panorama and become familiar with the tools, which is why 8 of the 17 publications propose this strategy, being the most cited and one of the cheapest.

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Organizational diagnosis in a consulting services company, in Villahermosa Tabasco, for the design of a proposal

Diagnóstico Organizacional en una empresa de Servicios de Consultoría, en Villahermosa Tabasco, para el diseño de una propuesta

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Abstract

Objective: Carry out an Organizational Diagnosis, through applied research in the field of a service company to the industry. Methodology. In the first instance in this project, each of the areas and / or departments that make up the company are known, and each of the functions that make up the departments, which will serve as a basis for their study and analysis. Formats are designed to collect the information, information was collected for the design of the Contextual Framework, Conceptual Framework and Theoretical Framework. The research is non-experimental, descriptive and at another time correlational. Techniques such as brainstorming, the Likert scale and the Self-diagnosis scale were applied, which serve as the basis for determining the current situation of the company and determining opportunities for improvement in the specialized consulting services offered by the company. Contribution. Once the results are obtained, a proposal is designed for the company through a Development Model, so that it can increase its Productivity and allow it to be more competitive within the market.

Organizational diagnosis, Context, productivity

Resumen

Objetivo: Realizar un Diagnóstico Organizacional, a través de una investigación aplicada en el ámbito de una empresa de servicios a la industria. Metodología. En primera instancia en este proyecto se conocen cada una de las áreas y/o departamentos que integran la empresa, y cada una de las funciones que integran los departamentos lo cual servirá como base para su estudio y análisis. Se diseñan formatos para hacer el levantamiento de la información, se recopiló información para el diseño del Marco Contextual, Marco Conceptual y el Marco Teórico. La investigación es no experimental, descriptiva y en otro momento correlacional. Se aplicaron técnicas como la tormenta de ideas, escala de Likert y la de Autodiagnóstico, mismas que sirven como base para determinar la situación actual de la empresa y determinar oportunidades de mejora en los servicios especializados de Consultoría que ofrece la empresa. Contribución: Una vez obtenidos los resultados se diseña una propuesta para la empresa a través de un Modelo de Desarrollo, para que ésta pueda incrementar su Productividad y le permita ser más competitiva dentro del mercado.

Diagnóstico organizacional, Contexto, productividad

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Introduction

This study is carried out, mainly due to the growing globalization that has generated a single world market, where the competitiveness or capacity of organizations to maintain and survive is tested daily, generating a permanent attitude of adaptation and change on the part of the companies. companies, who aspire to success in their industrial or business segments. In this sense, the Productivity and Competitiveness of organizations becomes the fundamental difference that identifies a successful organization, because it is the basis for generating greater profits through efficiency in the use of the resources necessary for production. Strategies will be generated to improve the administrative and technical services of the company, in its areas of training, consulting, marketing and engineering services.

The objective of this project is to carry out an organizational Diagnosis of a Consulting company, in Villahermosa Tabasco. Which will serve as a basis for designing strategies to make the company more efficient and effective, through the design of a proposal for a development model for it.

The project considers the contexts: international and national. It provides the different theoretical foundations on which it is based. The methodology used is given. Then the Diagnosis that was made to the company is presented, from which results are generated that will be taken as a basis to design the proposal for the Consultant, which will improve its productivity. Finally, the proposal is presented through the design of a model.

Background

The Consulting company carried out in 2014, a project on Process Improvement, where it was determined that the process of acquiring materials with its suppliers should be strengthened. Which was considered and this process was improved. In 2013, a project was carried out on the Curriculum vitae of the company, which defines each of the 5 areas of services that it provides as a company (Consulting, Training, Corporate Development, Marketing and Industrial Safety and Industrial Protection), as well as as well as with which companies there are alliances as suppliers, among which are: Allison Security, Salvatore Industrial Footwear, among others.

Its main clients could also be detected: Industrias Somi S.A de C, V., Manometres y Bridas S.A de C.V., Auto Pro de México S.A. de C.V., Bronco de México S.A. de C.V. among others.

Problem Statement

The Consulting Company does not currently carry out activities to improve its processes on a continuous basis. In its processes there are some problems such as: customer service, training, Corporate Development, Marketing and Industrial Safety, to which a solution can be found taking advantage of all the resources available to the company.

International Context

Current trends in the world, such as the globalization of markets, continuous technological changes, commercial and political openness, and global integration through the media, have led companies to be in a permanent state of alert both with regard to what is happening in its environment and the functionality and efficiency of its internal structures and processes to adapt and take advantage of these changes.

The attempts of Latin American organizations to adapt to the economic and social development that is being experienced today in many of our countries have required a variety of changes from them. In the private sector there is a tendency to develop skills to compete in a highly demanding global environment, while in the public sector there is a modernizing trend aimed at improving the services provided to its users. To facilitate this adaptation process, it is necessary for organizations to know their strengths and weaknesses to face the environment. So the organizational diagnosis is the process by which organizations can have a more precise and complete knowledge of their capacities and weaknesses. The knowledge that originates from this process allows the different organizational actors, on the one hand, to identify what those change needs are and, on the other, to manage the change more efficiently (Academia Magazine, Universidad de Chile. 2011 no. 19).

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In Bogotá, Colombia in 2012, a diagnosis was made to a Business Services company, through an analysis of its administrative, financial and strategic aspects, in order to make proposals that generate value through changes that adapt to the organization improvement processes. The diagnosis of the company Staff Servicios Empresariales, carried out an investigative and analytical study of the company, in which a description and analysis of the company is made, carrying out a tour of the different areas and surroundings of the same. Its history, its processes, development, progress and main strategic factors that will be presented in the corresponding matrices are analyzed. In addition to this, the diagnosis shows the growth of the services sector and its strengthening in the Colombian market.

National Context

In this context, a company from Tuxtla Gutiérrez Chiapas is considered, a Grupo Inmobiliario de Construcciones, who carried out an organizational diagnosis, in 2011, in order to detect in which areas of the company it has deficiencies, and to these apply innovative and efficient models that help to improve the quality of the company's results and, in turn, have a greater growth and impact on the market. Thus locating with this diagnosis: strengths, weaknesses, threats and opportunities for improvement, which involves a SWOT analysis to observe how all these elements found in the organizational diagnosis can be taken advantage of and that can be used for their greater use.

Theoretical fundament

Organizational diagnosis is the study, necessary for all organizations, which is responsible for evaluating the situation of the company, its conflicts, this is what problems exist in the company, its potentialities or how far it can go and development paths that is the way to follow for its growth. In general, it could be said that an organizational diagnosis seeks to generate efficiency in the organization through changes. Organizations, with all their implications, are the result of the search that rational man has led to prosperity. (Luhmann, 1997), stated that organizations are social systems that define themselves by giving way to the union of a generalized motivation.

Investigation methodology

The population that was considered to carry out the organizational diagnosis in the company, is 6 departments and the general management, to which an instrument was applied. A general tour of the company was carried out, where each of its six departments that make it up as well as the general management on which these departments depend was met. It was learned about the functions that each of these departments have. Then their service processes were known. Meetings were held with the staff to learn more about the departments; where they expressed themselves about the activities of each one of them as well as the problems of the company, this was done through the Brainstorming rain technique. Interviews were held with the personnel, so that with the information provided by them later, formats could begin to be designed to collect the information. The instrument format was designed using the Self-Diagnosis tool, Comprehensive Instrument for Productivity Measurement (IIMP), which was applied to each of the departments. The information generated with this tool provided results for the company. The tool (IIMP) has the purpose of measuring processes with 10 elements. In order to know about the organization what its current actions are and to be able to take corrective actions, by controlling its processes to improve its integral productivity.

10 elements of (IIMP) to measure each of the processes:

- Measurements related to the end customer.
- Measurements and / or process performance.
- Alliances with suppliers.
- Structuring and management of documentation.
- Skills and Skills Development Training.
- Benchmarking.
- Process adaptability.

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– Evolution of human resources.

– Evolution of management level.

– Continuous improvement scheme.

In table No. 1 and 2, the development of two of these ten elements is shown.

Instrument

Instructions:

Following are questions in each of the elements referring to the company, which make it up, mark with an "X" under the number that you consider appropriate.

Element 1: Measurements related to the end customer.

Objective: To know all the aspects related to the client and that impact on the processes of the organization.

		PROGRESS IN %									
		10	20	30	40	50	60	70	80	90	100
1	Do you have an up-to-date method to know customer service satisfaction?										
2	Do you have programs that allow customers to ensure good service or satisfaction?										
3	Do you have a scheme that allows you to receive complaints and prompt solutions from customers?										
4	Do you have a Customer satisfaction measurement program?										
5	Do you have Effectiveness and Efficiency Indicators in relation to Clients?										

Evaluator's comment _____

Table 1 Comprehensive Instrument for the Measurement of Productivity, element 1
Source: Author's Perception, 2020

Element 2: Measurements and / or process performance.

Objective: Comprehensively analyze each of the actions that are developed in the processes and their interrelation between them, for the achievement of the integral objective.

		PROGRESS IN %									
		10	20	30	40	50	60	70	80	90	100
1	Do you have a method for measuring productivity?										
2	Do you periodically evaluate the areas and immediately address the detections in low performance?										
3	Do you evaluate the impact of context variables on processes?										
4	Do you analyze leadership performance records?										
5	Do you have a Scheme that allows you to measure or compare yourself with other companies?										

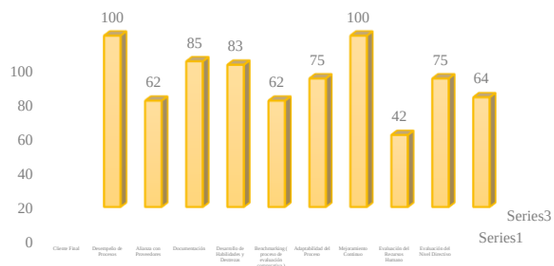
Evaluator's comment _____

Table 2 Comprehensive Instrument for the Measurement of Productivity, element 1
Source: Author's Perception, 2020

The instrument was applied to each of the 7 departments of the company, measuring in each of them the 10 elements mentioned, in Table 3 and graph 1, it is shown for the Department of Financial Resources.

Elements	
Final client	100
Process performance	62
Alliance with Suppliers	85
Documentation	83
Development of skills and abilities	62
Benchmarking (Benchmarking Process)	75
Process Adaptability	100
Continuous improvement	42
Human Resource Assessment	75
Management Level Assessment	64
Average 748/10	75

Table 3 Comprehensive Instrument for the Measurement of Productivity, of the 10 elements in the Department. of Financial Resources.
Source: Author's Perception, 2020



Graphic 1 Comprehensive Instrument for the Measurement of Productivity, of the 10 elements in the Department. of Financial Resources
Source: Author's Perception, 2020

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In this department it can be seen that its priority is the End Customer, with 100% giving the best attention to this area is a priority, the second sub element with 100% is the area of adaptability of the processes, and with 85% a good communication with suppliers and determination to be able to carry out their work. Although it has a 42% in the sub element of continuous improvement. In total with a 75% score in the advancement of all sub elements, so it is located in the Development stage. To determine the scale of Development of the organization, the following criteria are used:

%	Level of development of the organization
10-40	Incipient
40-60	Initial
60-90	Developing
90-100	Productivity-centric approach

Table 4 shows the comprehensive measurement of all the departments in the company, where it can be seen that the Department of Industrial Safety and Environmental Protection with 92% and the Department of Corporate Development and Consulting with 90%, maintain or point out that the processes that are lived within the company are at the forefront of each of the sub criteria that were evaluated, the lowest was the Department of Financial Resources with 75% this is due to the few personnel that you have within this area.

Department	Average
Human resources	82
Financial resources	75
Material resources and marketing	80
Consulting and corporate development	90
Training	81
Industrial safety and environmental protection	92
General management	84
General average	83.4

Table 4 Comprehensive measurement of the departments of the Consulting company.
Source: Author's Perception 2020

Results

With 83% (Table 4) as a result in the Diagnosis made in the Integral measurement of the Consulting Services company, there is an acceptable development of the company in terms of productivity, although there are several details within each department, due to the fact that they follow a pattern of carrying out the activities, according to the company that is requesting their services, be it training or consulting.

The departments with a lower percentage are those of Financial Resources and Material Resources and Marketing, so it is necessary to strengthen the development of their processes, their skills and abilities, as well as continuous improvement in them. It is considered that in general these aspects should be strengthened throughout the company, so that it passes from its development stage to an approach focused on productivity.

Conclusions

After having carried out the present project in the Consulting Services Company in Villahermosa Tabasco, and having made the integral diagnosis in it, the objectives set out in it were achieved, through the application of the Integral Instrument for the Measurement of the Productivity, it was found that the company obtained a global evaluation of 83% which represents that it is at a Productivity Development Level, so it is proposed to constantly measure the organization for continuous improvement.

Increasing productivity is the path that the company must follow in order to achieve sustainable growth that allows it to strengthen and expand into new markets. This can occur thanks to technological and technical improvements, the introduction of incorporated and disincorporated changes in its processes and the better use of resources, which allow generating the greatest real efficiency of the organization, and with a minimum of errors; also have a lower or sufficiently competitive cost function compared to other competing companies, in order to maximize profits.

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Evaluation of the competitiveness elements in the operating areas of industrial SMES

Evaluación de los elementos de competitividad en las áreas operativas de PYMES industriales

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Abstract

Systemic Competitiveness is related to the neoclassical theory, which defines the efficient use of production resources and the opportunities to concentrate their products in a market niche (Gil and Torres, 2009). To be competitive, organizations need to align their internal processes, especially in the operations that are daily carried out and are the substantive basis for competition. This research demonstrates the carried out evaluation in the operations functions of small and medium enterprises (SMEs) in the industrial sector in the main cities of Sonora, Mexico. The applied model describes systemic competitiveness, supported by the Economic Commission for Latin America (ECLAC, 1990) under the argument (Suñol, 2006). This methodology describes the required steps for the application of the instrument in the main cities of the state, and thus the objective of evaluating the activities and elements of the micro level that validate systemic competitiveness as indicated by various theoretical models on how to compete for companies. The results describe the evaluation of the elements that contribute to the administrative management in the internal processes and the elements of the administrative management. Finally, the main findings are presented in the conclusion.

Competitiveness, Operational elements, SMEs

Resumen

La competitividad sistémica está relacionada con la teoría neoclásica según Gil y Torres (2009), la cual define el uso eficiente de la asignación de los recursos de la producción y las oportunidades de concentrar sus productos en un nicho de mercado. Las organizaciones para ser competitivas, requieren alinear sus procesos internos, sobre todo en las operaciones que con se llevan diariamente y que son la base sustantiva para competir. En esta investigación se evidencia la evaluación realizada en las funciones operaciones de las pequeñas y medianas empresas (PyMES) en el sector industrial en las principales ciudades de Sonora México. El modelo utilizado fue el que describe a la competitividad sistémica, apoyado por Comisión Económica para América Latina (CEPAL,1990) bajo el argumento (Suñol, 2006). Esta metodología describe los pasos que se requirieron para la aplicación del instrumento en las ciudades principales del estado, y así el objetivo de evaluar las actividades y elementos del nivel micro que validan la competitividad sistémica como la señalan diversos modelos teóricos sobre la forma de competir por las empresas. Los resultados describen la evaluación de los elementos que contribuyen en la gestión administrativa en los procesos internos y en los elementos de la gestión administrativa. Presentando en la conclusión los hallazgos principales.

Competitividad, elementos operativos, PyMES

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Introduction

In order to describe what the concept of competitiveness implies from the point of view of organizations and to be clear about its dimension of what it means to be competitive, Michael Porter (1990) points out that it is necessary to analyze the factors that are required in production, and to understand the economy in which they are developed. Suñol's study (2016) argues that the success of internationally competitive companies is preceded by a prolonged macroeconomic stability in the country of origin; furthermore, it allows the creation of a competitive macroeconomic environment due to "the availability of physical, natural, institutional and human resources, which, when well managed in the long term, are catalysts where companies can compete globally".

In countries with scarce economic resources, it is necessary to take care of their productive processes and invest in the development of the sector where it is produced. Likewise, the theory of competitiveness points out that when describing and studying them, it is evident to assume that governments and the productive sector should be interested in the growth and welfare of each country (Ibarra, Gonzalez and Demuner 2017).

Since the early nineties, the Economic Commission for Latin America (ECLAC), which is mentioned by Hernández (2011) along with other authors, states that "competitiveness is defining the factors that are oriented to the region's productivity in a country and long-term growth, technological evolution and innovation in production processes" to be competitive.

Ibarra, Gonzalez and Demuner (2017), under the systemic competitiveness approach, mention that the organization is also related to business factors that are defined as the situations or activities where the entity has control; moreover, they are located with the grouping of knowledge, strategic actions and internal activities that strengthen technological training in their processes, products, organizational method, human resources and its proper functioning in the administration management (micro aspect of the systemic model).

Figure 1 shows the relationship between the levels of the systemic competitiveness model and its levels in relation to business factors (Medeiros, Goncalves, Camargo, 2019).

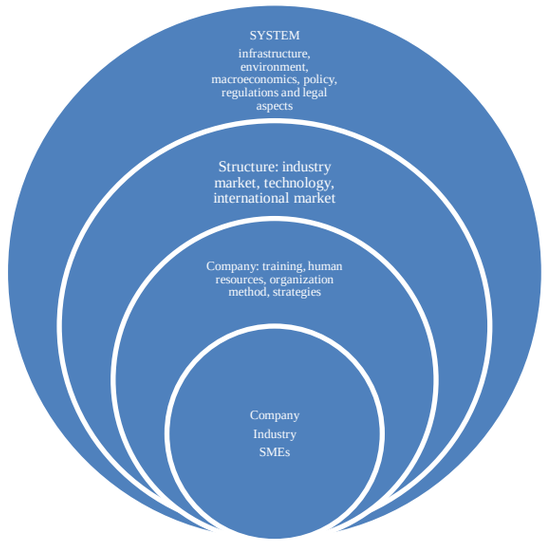

Figure 1 Diagram of competitiveness determinants
Source: Medeiros, Goncalves, Camargo (2019) on the basis of J. Ferraz, D. Kupfer and L. Haguenauer, made in Brazil: Competitive Challenges for the industry, Rio de Janeiro, Campus, 1996

Analyzing and reflecting about the concept of competitiveness, this article describes industrial organizations in the state of Sonora, Mexico, focusing in the main cities: Hermosillo (state capital), Ciudad Obregon, Navojoa, and Nogales. The latter has a number of industrial companies that are located in the main line of businesses of the industry type in Table 1.

Industrial Sector	Size (Large, Medium, Small)
Mining	Medium
Food Industry	Small and Medium
Chemical Industry	Medium and Large
Metal products	Small and Medium
Manufacture of machinery and equipment	Medium and Large
Electronics factory	Medium and Large
Electronics factory	Small and Medium
Communication	Medium and Large
Measuring equipment	Medium and Large

Table 1 Composition of the industrial zone in Sonora Mexico
Source: According to data from the National Institute of Statistics and Geography (INEGI) and the Ministry of Economy (SE)

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Industry is the secondary activity of the state's economy and is composed by the mining, manufacturing, construction, electricity, and food industries as identified in Table 1.

The state of Sonora, according to statistics, reports from the INEGI (2015), shows the following economic participation of the productive sectors. This figure identifies the commerce, industry, service and real estate, and others.

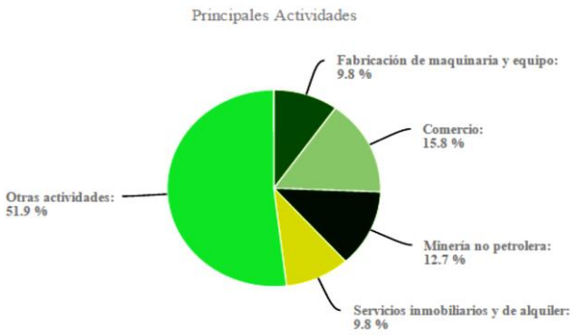

Figure 2 Economic Activities in Sonora
Source: National Institute of Statistics and Geography (INEGI) and the Ministry of Economy (SE)

Figure 2 shows the percentages of the economic sectors as follows: commerce is at 15.8%, non-oil mining at 12.7%, real estate and rental services of personal and intangible property 9.8%; manufacture of machinery and equipment 9.8%, and 51.9% in other sectors, such as agriculture and primary order activities. Together, they represent 56.1% of the Gross Domestic Product (GDP) in the state.

As a result, the participation of the industry in Sonora represents an important factor in the economy and its competitiveness will be of great help as the models related to systemic competitiveness establish.

The business factors or elements are very important in the development of competitiveness; they require structural aspects, such as: the market where they participate, the quality of their products, technology, human resource, training and qualification of its workforce, determined as the micro part of a system of competitiveness.

The neoclassical theory (Gil and Torres, 2009) calls that competitiveness is a problem that must be solved, with the intention that companies through the efficient use of resources and their management help control and alignment of their internal processes; in addition, to seek standardization where it can be established the parameters of evaluation and measurement of results in the performance of each of the industry.

This article is a further contribution to the literature on the competitiveness elements and how it is developed in the industrial sector in small and medium enterprises (SMEs), which are located in the most important cities of the state of Sonora.

For this purpose, the objective was to evaluate the competitiveness elements in the functional areas of the studied entities of the industry; thus, achieving a first advance on this study.

The methodology was based on the concept of systemic competitiveness (*Esser, Hillebrand, Messner and Meyer-Stamer, 1996*) as indicated by Suñol (2016) and the Economic Commission for Latin America and the Caribbean (ECLAC). They characterize it by the development of the industry achieving success.

The production of the industry and its administrative management create the elements at the (micro) level. The conditions of a macro economic environment are when the support of the government is involved, the demands of private companies for competition.

Finally, the middle level involves politics, socio-cultural factors, as well as high standards in the organizations.

Similarly, a series of bibliographic records focused on competitiveness were considered. The application of an instrument was used to evaluate the alignment of their internal processes, which start from production: acquisition of inputs, hiring of qualified labor, organizational training, use and support of technology, market research, product innovation, and other variables that support daily operations in the industry and good administrative management.

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Theoretical Framework.

Sánchez, Delgado, Jimenez and Coronado (2019) mention that there is a diversity of concepts related to the topic of competitiveness; however, most authors agree that it is "a multifactorial variable that ranges from business training, management skills, innovation and development of new products based on technology" (pp: 57).

Other bibliographical references describe competitiveness in the same term as being a variable that depends on many factors, including the business culture, and the required skills in business administration, which include the micro economic part of the entities (the labor, productive, management, innovation and technology aspects), according to Sánchez, Vázquez and Mejía (2017: pp.96).

In relation to the concept of the systemic approach, the levels that are placed consist from micro (internal situations of the organization), macro (public, fiscal, market policies, and relations between companies), middle level (infrastructure, region, patents, and knowledge infrastructure), to the Meta level (which implies cultural factors, legality, strategic and political capacity).

Level	Elements
Micro	Human Resources Training Information Technology Production Finances Marketing
Macro Level	Budgetary Policy Fiscal Policy Monetary Policy Market Policy Exchange Policy Commercial Policy
Middle Level (with the region)	Material Infrastructure (Logistic capital, public service facilities) Knowledge Infrastructure (Qualified human resources)
Meta Level	Sociocultural Factors Scale of Values Basic Patterns of the Organization Strategic and political capacity

Table 2 Systemic Competitiveness elements or factors
Source: Own elaboration with the support of the Ibarra, González and Demuner (2017) study

In summary, the conceptualization of competitiveness can be known as a concept that includes different elements. It is related to the internal structure of the company (Benavidez, Muñoz and Parada 2014), and the contextual environment.

The level of the company is direct and in it will derive the competitive advantage, through the methods of production and the way in which it is organized. That is why it will certainly be reflected in the price of the products and quality.

The participation in the market (Abdel and Romo, 2014) describes the activities that are part of this level. They are associated with research and development of their products, seeking to satisfy customers and innovate to offer a better product, without forgetting the quality commitment.

As long as the income or the invoicing of its sales, the permanence of its clients will be a clear element of being competitive (Benavidez, Muñoz and Parada 2014).

The systemic competitiveness model provided by the research center of the Instituto Autonomo de México is determined in Figure 3.

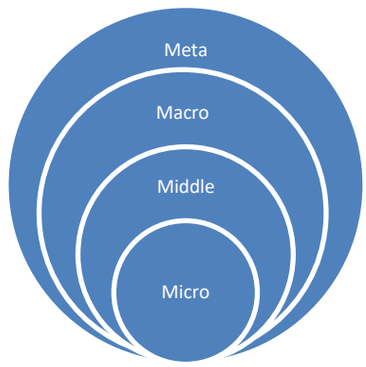

Figure 3 "Model of Systemic Competitiveness"
Source: "Centro de Estudios de Competitividad" of ITAM in Mexico

In it, the levels of measurement and/or evaluation for competitiveness are placed, being the base the micro level as the strength of the industries to achieve the alignment of their processes.

Within the issued reports by the documentary data of the industrial sector in Sonora, the government has tried to support competitiveness and innovation with actions that have allowed the attraction of investments throughout the region. That is why it has invested in infrastructure, reflected in roads, energy, partnerships with the private sector, and continuous training in skilled labor.

The achieved result in 2018 consisted in "41 investment projects in the strategic economic sectors of the entity, for an amount of 2 billion dollars, which will generate around 8,400 new jobs" (Secretary of Economy, 2018). In this sense, the micro aspect is favored in the hiring of qualified labor, and at the macro level the participation of the government and its public policies contributes to the achievement of such competition.

Another participation supported by public policy, was the development of science and technology, promoting innovation, knowledge generation, and technology transfer, through the management of support programs.

These projects benefit the Sonoran industry, creating research centers, technology parks, scholarships for students to study abroad (Sonora-Arizona) among other support, according to the 2018 government report: National Institute of Statistics and Geography (INEGI) and the Ministry of Economy (SE) (2015).

The Meta and Macro level are activated in the state of Sonora, now it is necessary to observe the small and medium companies that are in the Sonoran industry.

The strengthening of the development of the entrepreneurial culture in the state was also increased. Through linkages programs, entrepreneurs and SMEs reached different segments of the state's economy; connecting the services, products and programs that exist in the entrepreneurial ecosystem, through training for growth and strengthening in business.

The most important cities were considered as: Hermosillo, Obregon City, Navojoa, and Puerto Peñasco, Nogales with the intention to promote the enterprise competitiveness, participating 485 industralists and thus fomenting an enterprise culture in Sonora: National institute of Statistics and Geography (INEGI) and the Secretariat of Economy (SE) (2015).

The development in the industry has been driven by government policies in the report for the 2018 fiscal year. 48 projects were invested in this sector, and it amounted to $2,313 million dollars, generating approximately 8,770 new jobs.

The projects supported infrastructure in industrial parks, improvement to the highway that connects Sonora-Mexico with the United States and the main cities, and a new plant for the generation of electrical energy and a salting plant. Without a doubt, these contributions make it possible to support competitiveness at the Meta, Middle and Micro levels, according to the systemic model, which is why the internal strengths of each of the small and medium-sized industries must be added.

To align the processes within industrial entities, it is necessary to take into account the following elements:

– Financial management.

– Human resources and continuous training.

– Process innovation.

– Quality in production processes.

– Information systems.

– Among others.

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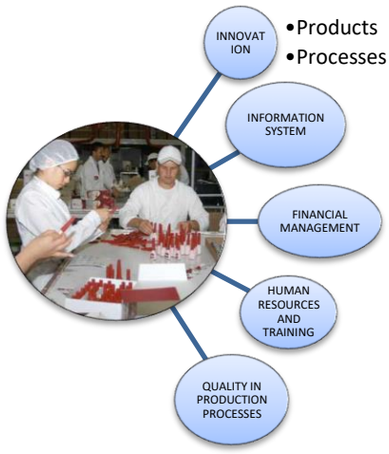

Figure 4 Competitiveness in SMEs. Micro elements of industrial entities
Source: Aragón and Rubio (2005a), Aragón and Rubio (2005b), Chablé and Aragón (2009)

By observing this figure, the key processes to be aligned in small and medium sized companies are identified so that they are correctly structured internally and can compete. First, they must focus all their strengths, and continue to pursue opportunities with the confidence that the industry, the customer, and the government will be a link to their growth and assurance in the marketplace.

Methodology

The research has been proposed at the levels of the competitiveness system, starting with the micro phase and establishing itself in the most industrialized cities in the state of Sonora. An investigation instrument was applied to evaluate the alignments of the elements of competitiveness in the participating SMEs; likewise, a procedure was established contemplating a first advance in the investigation.

Object of study: The preliminary progress presented in this article is considered 50 major industrial SMEs.

Materials: A research instrument was used, which questions are aimed at evaluating internal processes and activities in the industry: productivity, performance and marketing of their products and other aspects.

The questionnaire contains 60 items, validated in other investigations of this nature and was adapted for this state.

The application used various means of communication with the business sector and application level was manager or the responsible for the administration of small and medium enterprises.

The instrument was applied in the following ways:

– Personal visit to the manager through a previous agenda with him.

– Telephone call.

– Via e-mail.

– Interview recording.

In addition to relying on bibliographic and statistical package materials and validation of results.

The Procedure was established in various phases:

– The first stage of investigation.

– The research instrument was established by the author: Ibarra, González and Demuner (2017).

– Statistical data from the state of Sonora about the SMEs.

– Visitation to the companies, phone calls, and emails.

– Results analysis of the application of the instrument.

The essential aspect for this preliminary research was the model dimension, which was exclusively for the micro elements posed by the systemic competitiveness model in the studied entities.

During the process, the study was also limited to the most important cities in the state: Ciudad Obregon, Navojoa, Hermosillo, Nogales and Empalme. As part of the process, a variety of difficulties were faced, regarding the delivery of information by other companies that did not provide information.

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Finally, it was possible to obtain a response from the industries that wished to participate and provide the requested information; however, in this preliminary phase, the following results are shown.

Results

The presented statistics in this section are the obtained results through the information provided by the surveyed entities.

Industry classification in Sonora	Frequency	Percentage
Food	17	30.4
Textile	2	3.6
Sausage and packaging	2	3.6
Pharmaceuticals	1	1.8
Technological	3	5.4
Engineering	5	8.9
Construccion	1	1.8
Electronics	1	1.8
Others	23	41.1
17	1	1.8
Total	56	100.0

Table 3 Industry Classification in Sonora
Source: Own elaboration with the support of the study of Ibarra, González and Demuner (2017)

Figure 3. The Diversity of the Industry in the state of Sonora. The Food industry has 30.4% and 41% shows the diversity of existing industries.

Important cities of Sonora	Frequency	Percentage
Cajeme	30	23.6
Navojoa	2	3.6
Hermosillo	56	60.5
Nogales	4	7.1
San Luis Rio Colorado	1	1.8
Empalme	1	1.8
Other	12	21.4
Total		100.0

Table 4 Important State Cities with Industry
Source: Own elaboration with the support of the study

As you can see, Hermosillo has a higher percentage of small and medium companies in the industrial sector. Nogales, despite being a border city, is characterized by the fact that industrial machinery is a big industry. Ciudad Obregon continues to be the second place at the state level.

Average years	% of industry SMEs
1 a 5 years	21.4%
6 a 10 years	19.6%
11 a 15 years	14.3%
15 and above	44.6%
Total	100%

Table 5 Evaluation of the average age of the SMEs industry
Source: Own Elaboration

As shown in Table 5, the highest percentage is 44.6, considering that in spite of the adversities; most of the small and medium industrial companies have survived.

Likert Scale	Frequency	Cumulative %
Always	8	34.8%
Often	5	21.7%
Sometimes	9	39.1 %
Rarely	1	4.3%
Total		100%

Table 6 Evaluation of strategic planning for its improvement as an organization
Source: Own elaboration with the support of the study of Ibarra, González and Demuner (2017)

In this table, it can be identified that 50% of the industry elaborates and plans to improve their processes, and the rest of 50% to consider them more frequently. The element of having an information system for good administrative management and supporting decision making is shown in Table 7.

Likert Scale	Frequency	Cumulative %
Excellent	16	23%
Very Good	30	65%
Good	8	12%
Fair	0	0%
Total		100%

Table 7 Evaluation of the impact level of the information system on decision making in the industry (financial, administrative and production)
Source: Own elaboration with the support of the study of Ibarra, González and Demuner (2017)

In relation to its information elements, all industrial SMEs have support in the decision making with timely and reliable systems.

Product or process innovation element	Totally Agree	Agree	Indifferent	Not Applicable
Processes	55.4%	35.7%	7.1%	1.8%
Products Innovation	55.4%	36.1%	8.2%	1.5%

Table 8 Evaluation of product and process innovation
Source: Own elaboration with the support of the study of Ibarra, González and Demuner (2017)

In Table 8 it can be seen that most of the industry carries out innovation and improvement in the products it offers to the market and the percentage that does not do so is very low.

Financial Management Element	High	Medium	Low
Payment to Supplier	30.4%	57.1%	12.5%
Calculation of Production Cost	42.9%	44.6%	12.5%
Taxes Payment	67.9%	28.6%	3.6%
Inventory control system	53.6%	41.1%	5.4%
Financial Strategies	35.7%	48.2%	1.6%

Table 9 Evaluation of the Financial Management Element in Industrial SMEs
Source: Own elaboration with the support of the study of Ibarra, González and Demuner (2017)

In this table, it is shown that in relation to financial management, the studied industry has a high control of operations and functions, and only a small percentage of 'SMEs' are observed to lack compliance with this element.

Conclusion

Once analyzed the results corresponding to the evaluation of the elements that compose the micro level, under the systemic model presented in the study of (Ibarra, Gonzalez and Demuner, 2017) and with attachment to the model of CENAPAL, the conclusions are generated.

The evaluation of the daily activities carried out by the industrial entities studied in this project, shows that strategic planning efforts to improve the organization with 56.5%, meaning that they are aligned and strengthening their administration.

On average, the industrial sector in the most important cities of the state of Sonora has been in existence for 15 years, which is very favorable for being in the current competition; this means that they have overcome a diversity of challenges in their business environment.

In the evaluation of the information system that the organizations have, it is of great help for the decision making. The percentage in which it is found is between 23% and 65%, where the majority aligns its information under systems, as much financial as administrative, and of production.

The human resources working in this sector are trained and everything related to this factor, i.e. the evaluation is favored, from the highest compliance to the medium, with a high percentage of industrial companies, and only a small percentage seems to lack improvement in this process.

In relation to the market study, most of these SME industries do carry out this process, and only 3% of them do not, which should be considered as a future improvement.

As far as product and process innovation is concerned, 90% of them are carried out and complied with in order to remain competitive and current in the market, thus supporting consumer preference.

Finally, as for the financial management element, undoubtedly any manager, owner or director requires good finances and cash flow since the operation of the business will depend on it, as mentioned in the Financial Reporting Standards (FRS). 88% of the companies consider having a high and medium control of such operation; however, there is a percentage of 9%, which is a concerned factor for competitiveness.

The most important findings are related to the acceptance of what the systemic competitiveness models propose. The government of the state of Sonora has developed a variety of strategies and policies at the state level that help strengthen these organizations, which in turn contribute to the GDP with interesting participation, generate direct and indirect employment, and pay taxes that translate into better infrastructure, which is a key factor for competitiveness.

Another important fact is that in the industrial sector in the most important cities such as Hermosillo, Cd Obregon, Navojoa, and Nogales there are competitive and strengthened companies in their administration and aligned with their internal processes. This base is necessary to fulfill each element described in the models of competitiveness, as indicated in the study by Ibarra, González and Demuner (2017).

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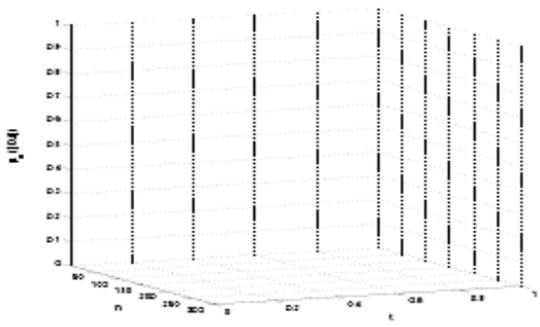

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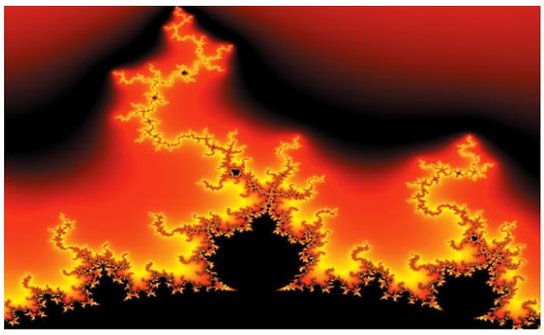

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