Innovation Management Model as a Source of Business Competitiveness for Industrial SMEs

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***Abstract*—One of the main problems of small companies is not knowing how to properly manage investments, resources, strategies, tools and responsibilities to be more competitive, the research objective is the development of management and innovation processes required by the new company for its permanence in the market and decision making to be carried out every day; small companies face the competitiveness of new products that emerge. Today there are a great variety of products, which are globally interconnected, therefore it is required to implement a structural equation model for its management, so that the company continuously improves and optimizes the available resources, therefore as a result is the management, focused on greater effectiveness of resources; so it is necessary that small businesses need to manage a model of investments, resources, tools and responsibilities to obtain support from the competitiveness of the market; which would allow it to be oriented to a sustainable development and be one step ahead of the competition.**

Keywords*—Competitiveness; continuous improvement; management; optimization; strategies

I. Introduction

Currently innovation has taken great importance in the small business sector to be sustainable in the market must have an analysis of the variables that determine the operation of a process in the execution of actions of the main factors that allow to achieve the goals, objectives and effectively complete the assignment tasks for which they were programmed, to achieve this should be considered to control complex processes with the help of different components for continuous improvement and have business success in a competitive environment [1].

In order to be competitive in the market, productivity must be increased and the quality of the products must be improved to achieve this, the implementation of technology and innovation that allows greater speed and optimal production is applied companies that work with various tools, devices and process control equipment must maintain the controls in operation for it is necessary to apply reliable and efficient tools [2].

For the role of innovation, it is necessary for the company to apply knowledge management, in order to obtain a higher level of commitment to achieve added value and be more competitive to achieve this, efficient and appropriate tools are needed to allow immediate solutions to problems, process control helps us to identify a system of continuous improvement for decision making in the company and optimize resources and goods, so as to ensure the effectiveness and efficiency in the process centers, opting for a mechanism for sustainable development, which was designed as a factor of organizational competitiveness [3].

A new work scheme allows to improve the processes and activities in a way to acquire a sustainable development from the point of view of the industry this has widely developed models of continuous improvement that allow to define the processes dedicated to the engineering components and where the most used technique is applied to break down the vision of the business in the strategic objectives, the establishment of different control panels allows to apply a model of development of techniques to manage the system, mainly of the processes of programming models and perform the analysis of the levels of innovation, the main results indicate that innovation has taken importance in identifying the factors of competitiveness, which affects the momentum of activities and generates value in the growth and development of economic sectors of companies that is becoming increasingly competitive [4].

II. Literature Review

Identified the wide variety of aspects that affect the organization of the company, such as planning and production control determining the anticipated way to raise objectives and scenarios that allow to organize and intend to achieve the established programs, to verify the work process or management in an organized and fast way, this control arises from the need to monitor the operations of productive process as the operation of different activities of the quality of products and services obtained [5].

The author in [6] raised a system that allows research to search, check and establish the objectives outlined, innovation generates competitive advantage to seek strategy that will enhance the sector of a not too distant future to develop the quality of resources and have the strategic management that leads organizations to be one step ahead of competitors [7].

The author in [8] manifests a research plan to analyze the state of available activities and resources and innovate performance in the relationship of obtaining competitive ability [9]. The internal control system of innovation processes allows to implement the improvement of business management of the sector [10]. The tool to achieve a better development of this internal control of research and innovation, establishes

activities that ensure safeguarding the identity assets of the information of the result records, to take indispensable action in the continuous improvement of the company, so that it identifies the activities that generate greater added value and be more competitive [11].

The author in [12] indicated, the entrepreneurial capacity of the productive sector has become the main essential element of the sustainable competitiveness of the sector, so the ability to innovate has allowed to achieve sustainable development, which is a major factor of a new environment to know better methods that is to innovate and improve these establishing ways that cause changes in products, processes and organizational systems, for such reasons companies must become aware in innovation that allows to generate competitive advantage [13] (Fig. 1).

A. *Competitiveness and Innovation in the Perspective of Business Development*

The author in [14] indicates the application, is oriented in developing and implementing standard controls with features applicable to the environment that interact the activities or processes in strategic plans.

The author in [15] mentioned that innovation is increasingly relevant in the agenda of entrepreneurs, the organizational model has been articulated from the control of production that allows to seek precisely the strategy for decision making in planning and innovate and be more competitive, in a changing world it has become a commonplace that innovation is key in the competitive construction in companies and sectors to continuous growth in innovation aspect, which allows to generate research and development centers or productive dynamics to realize and determine the main systemic approach [16].

The author in [17] stated to product or service innovation that allows the high degree of improvement with respect to the characteristics of implementing appropriate and technological methods in production, distribution or service with respect to enterprise resource planning that automates business practices in operational or productive aspect of the company, allowing to implement a new method of organizations applying business practice [18].

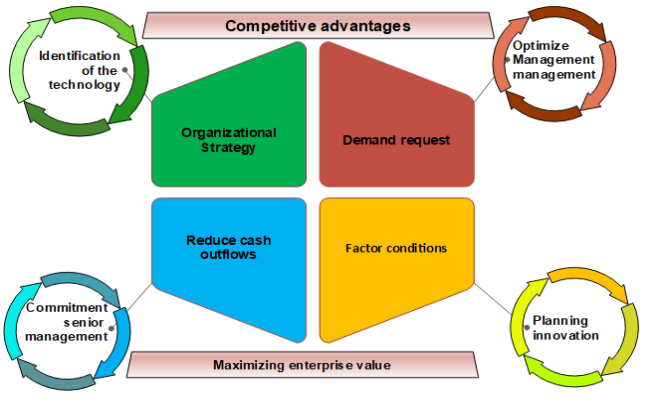

Fig. 1. Key Factors to Generate Competitive Advantage.

The author in [19], pointed out, the emergence of new marketing channels, has enabled the revolution of the application of technology and driven the change of market behavior that allows to obtain the business strategy, in achieving competitive advantage in innovation to learn the right mechanisms and put them into practice, the value of the premise that allows differentiation and positioning against the competition. Definitely [20]. Aspects allow to intervene in business development to have a more accessible notion and obtain results that bring benefits for research and knowledge to facilitate innovation in the generation of new ideas, novel and competitive products [21]. Therefore, it is shown in Fig. 1, competitive advantages, such as technology identification, optimization, and innovation are to obtain favorable results.

Translated with www.DeepL.com/Translator (free version), the author in [22] mentions the innovation of the entrepreneur as an engine of sustainable development, a key factor of the continuous growth model and the application of technology for the introduction of market goods, methods and generation of new raw materials allows to create from an idea, invention or recognition of a need for product development. The successful introduction in the market of new products or management and organizational techniques allows to innovate or create added value, new and significant [23].

The author in [24] focused on innovate, allows to create new value in the market on the premise of competitiveness that depends on the ability to innovate and improve to achieve competitive advantage, through technological innovation in the implementation of ideas, generate value to the product, consumer satisfaction and economic growth [25].

The author in [26] defines an open model of innovating and planning management systems, in which to implement a new commercial market, allows to improve product design in the presentation and development in an appropriate manner in the formulation of the response that allows to route the successful implementation of concrete result, there are factors that condition the economic environment by globalization, which arises the new competitiveness that surrounds us in the company and unstoppable in the growth of technological development [27].

B. *Challenges of Innovation for Sustainable Business Development*

The author in [28] stated, investigating the capabilities that allows companies to drive to be more competitive in innovation to become a strategic level, which we can group into two maneuvers that allow to improve productivity through cost reduction and highly innovative products.

Defined the environment of the company with economic growth of technological development and innovation, which forces companies to be more competitive, in innovation should consider the need to ensure business sustainability to productivity to maintain and improve competitiveness based on innovation, allows to design strategies of plans in differentiation to realize current new product designs and seek the new attributes of requirements and services requested by users [29].

The author in [30] proposed to investigate and invest the mechanism of adaptation of customer need that allows to create and develop a brand image to take of reference of the value chain of the company, the different elements that integrate allow to innovate and reorient the market modeling with the business objective, we can innovate periodically performing new designs of the products by investing in research, infrastructure, equipment and technology to implement the comprehensive development of a new competitive corporate culture.

The author in [31] mentioned that organizational research allows to determine the concentration and establish an innovative culture of different type of scope, in that way to reach and determine tools that help in the capabilities to create and innovate in the organizational method, allowing the resolution of the problem to synthesize and process information about certain instance; the challenge or problems in a visual way allows the exploration of innovative solutions [32].

The author in [33] details in the method of solving questions lightly that we must determine, the process of approaching each participant in assigning the premise on what we raise to create the reality to explore all possible variables, with the achievement of specific objectives that allows to know different scenarios to enrich the structure and identify and solve problems; in which to discover the implicit or explicit needs of the user to present alternatives and solve problems by generating a series of solutions through innovative prototypes.

The author in [34] proposed to provide information opportunities to generate new ideas through innovative thinking, and show the method of generating a business model, which allows to organize the development of an innovative and viable product model consisting of the methodology to assist in improving efficiency and to visualize the effectiveness of sustainable development.

As shown in Fig. 2, the structure of linear thinking allows to apply areas of thinking, observe and identify the innovative idea that comes from the search for opportunities in the environment of the ability to perceive the needs of the organization in concentrating a design to collect optimal service with innovative thinking to understand and focus on providing solutions to problems and provide opportunities to concentrate on the activity of discovering and getting more information [35].

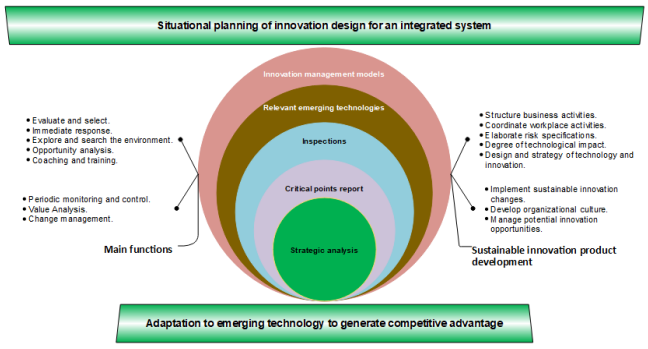

Fig. 2. Parameters of Technological Innovation Management.

The author in [36] detailed to the scheme that allows to demonstrate competitive advantage, constitute the key to improvement and sustainability that provides the perspective based on the importance of product innovation processes, productivity and sustainable development in competitive sectors and segments of companies that have the ability to improve and innovate to create and maintain capacity in a new approach to how to compete, in which it is to detect and discover segment of product and process characteristics to expand and refine the source of competitive [37].

The author in [38] manifests the dynamics of the innovative system of the first instance, promotes sustained investments as the best mechanism to circumvent the differences in productivity generated with a focus on gaining a competitive advantage, which allows to emerge the adversity of change and innovation of variables or key factors to achieve business success with a focus to be able to compete in the market, which lies in the ability of the company to innovate and maintain a competitive advantage [39].

III. Methodology

The present research encompasses a descriptive type design study of methodological approach that collects data from different aspects of the innovation system as a source of market competitiveness for small businesses, allows to perform a measurement analysis of improvements to implement and describe the behavior of the study variables, Therefore, a design is required to expose the thorough form in the studies to manifest the knowledge from the point to implement through structural equations for business development, this study aims to make a development for decision making through research that allows building elements that help identify the characteristics of analysis and diagnosis of all the factors of innovation to generate greater competitiveness [40].

The research presents a quantitative and non-experimental approach to collect data and information on small enterprises in Metropolitan Lima, allowing an analysis and diagnosis, thus concentrating on factors and variables that allow research and innovation to improve competitiveness. The units of analysis are determined in the diagnostic systems in order to propose immediate solutions that help to fulfill the functions for which they have been acquired, by prioritizing them [41].

During the research process, the redesign of the competitiveness process should be considered for continuous improvement through sustainable business development, allowing to determine and establish control parameters for this improvement, knowing any event that affects the performance of the markets to reduce the risks involved in taking measures to minimize possible losses and incorporate best practices for the implementation of methods, methodology, procedures for continuous improvement to improve the business economic development that will enable the most effective and efficient use in the available production that will allow obtaining the greatest possible amount of goods and services at a lower cost [42]. Establishing research and innovation actions to determine and minimize risks in operations, allows to establish the management to expand, optimize productivity and sustainable development of the company, in the research proposed in this document optimal decisions are made to expand capabilities in

business development that evaluates the management in a comprehensive, systematic way, taking advantage of the opportunities presented by the company [43].

The degree of competitiveness of the company is a key factor in the development for making decisions in an efficient and timely manner that allows to evaluate different areas of the company, thus being able to develop the proposed management model and the priority importance of evaluating the situation of the company to detect existing problems, establish priorities that allow to know the strengths and weaknesses and measure the productive performance of its economic activity.

IV. Results

The data analysis according to the structural methodology of the elaboration of structural equations proposed in the research methodology; starts with the reliability analysis of the instrument, evaluation of the factorial analysis, exploratory factorial analysis, confirmatory factorial analysis and elaboration of the structural equations model that performs the descriptive research of factors that obtains in carrying out the hypothesis testing ending with the results obtained. To obtain the Cronbach's Alpha with a coefficient 0.924, allows measuring the reliability of a measurement scale for the 39 items and a Cronbach's Alpha based on standardized items with a value of 0.924, by which, it indicates that there is an excellent level of internal consistency of instrument scale that exceeds the value of 0.9, explained in methodology of the present research can be observed in Table I.

TABLE I. Reliability Analysis and Diagnosis of the Instrument

Reliability statistics		
Alfa de Cronbach	Cronbach's alpha based on standardized items	N of elements
.924	.924	39

A. Item Reliability Analysis of Independent Variable

For the case of the independent variable innovation management model, the Cronbach's Alpha coefficient was obtained based on the standardized elements with a value of 0.918 higher than 0.9, obtaining an excellent coefficient in the indicators, as shown in Table II.

TABLE II. Analysis and Diagnosis of the Reliability of the Indicators of the Innovation Management Model

Reliability statistics		
Alfa de Cronbach	Alfa de Cronbach based on standardized items	N elements
.918	.918	20

B. Dependent Variable Item Reliability Analysis

It will allow to determine the degree of relationship between them, it is advisable to perform an individual analysis, for each variable and the dimension detailing the results obtained, by means of SPSS software version 25. For the case of the dependent variable source of business competitiveness of the Industrial SMEs, the Cronbach's Alpha coefficient based on the standardized elements 0.885 higher than 0.8 has been obtained, obtaining a good level coefficient in the indicators, which can be observed in Table III.

TABLE III. Analysis and Reliability Diagnosis of the Indicators of the Source of Business Competitiveness of Industrial SMEs

Reliability statistics		
Alfa de Cronbach	Alfa de Cronbach based on standardized items	N elements
.885	.885	19

C. Bartlett's Test of Sphericity Contrast Test

In the overall sufficiency analysis of the innovation management model as a source of business competitiveness of Industrial SMEs of the data evaluated with the data taken, by SPSS software version 25. With the KMO index of 0.906 given is considered an excellent value as seen in Table IV.

TABLE IV. KMO and Bartlett's Test for Integral Results

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy		
Bartlett sphericity test	Chi-square approximation	14186.893
	gl.	741
	Sig.	.000

D. Total Variance Explained

Considering the eight factors obtained in the explained variance table that should consider the existence of factors that are evidently that could not contribute the large extent of the structural equation model, for which, the use of exploratory result is required to be able to start the confirmatory analysis that could contribute to the theory of the research can be observed in Table V.

As can be seen in Fig. 3, the standardized confirmatory factor analysis values can be considered as the number of standard deviations by which the adjusted residuals differ from the zero-valued residuals, which will be associated with a perfect fit model.

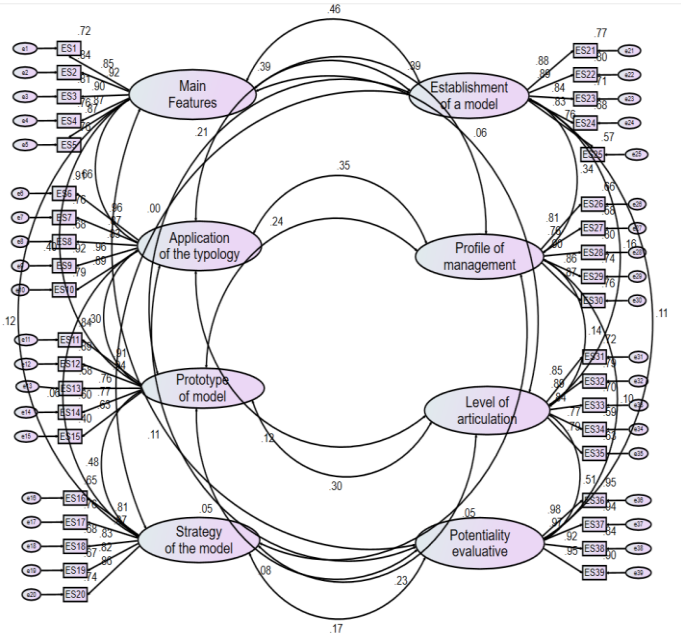

Fig. 3. Standardized Confirmatory Factor Analysis.

TABLE V. INTEGRAL EXPLAINED VARIANCE

Total, variance explained									
	Initial eigenvalues			Sums of loads squared by extraction			Sums of loads squared by rotation		
Component	Total	% of variance	% accumulated	Total	% of variance	% Accumulated	Total	% of variance	% accumulated
1	10.558	27.073	27.073	10.558	27.073	27.073	4.305	11.039	11.039
2	5.857	15.017	42.090	5.857	15.017	42.090	4.018	10.304	21.343
3	4.339	11.124	53.214	4.339	11.124	53.214	3.974	10.189	31.532
4	2.833	7.264	60.478	2.833	7.264	60.478	3.907	10.017	41.549
5	2.527	6.480	66.958	2.527	6.480	66.958	3.881	9.953	51.502
6	2.143	5.495	72.453	2.143	5.495	72.453	3.847	9.863	61.365
7	1.703	4.366	76.819	1.703	4.366	76.819	3.684	9.447	70.812
8	1.292	3.312	80.131	1.292	3.312	80.131	3.634	9.319	80.131
9	.654	1.677	81.808						
10	.512	1.312	83.120						
Extraction method: principal component analysis									

The results of the measurement scale adjustments of the confirmatory factor analysis model, the variables of the present research, it can be verified that most of them comply with a good adjustment of the model, specifically CFI=0.950, IFI= 0.950, TLI=0.945, NFI = 0.906 all complying with the norms with values higher than 0.90 and RMSEA= 0.053 lower than 0.08 complying with the specification of X^2 can be seen in Table VI.

The results of the fit measures of the confirmatory factor analysis model are detailed for the construction of the model and the results of the loadings of the unstandardized estimators of the structural equation model are also shown.

Fig. 4 shows the diagram of the values of the unstandardized loadings, it can be seen that it has a value greater than 0.5 from the latent variable to the observed variable; therefore, it presents an acceptable factorial loading.

TABLE VI. INDICATORS OF MODEL FIT MEASUREMENT

Statistics of model fit measurement indicators		
Absolute Adjustment Measures		
X^2	Chi-square and significance level (p)	1379.236
GFI	Goodness of Fit index	0.838
RMSEA	Root mean square error of approximation	0.053
NCP	Nocenttrality Parameter	705.236
RFI	Relative fit index	0.897
ECVI	Expected cross-validation index	4.278
RMR	Root mean square residual	0.043
Incremetal Adjustment Measures		
AGFI	GFI adjusted goodness of fit index	0.812
CFI	Comparative fit index	0.950
IFI	Incremental fit index	0.950
TLI	Tucker Lewis index	0.945
NFI	Normed fit index	0.906
Parsimony adjustment measures		
X^2	Normalizada X^2 / d.f.	2.046
PNFI	Parsimony normed fit index	0.824
PGFI	Parsimony goodnee of fit index	0.724
Others		
AGFI	Corrected goodness-of-fit index	0.812

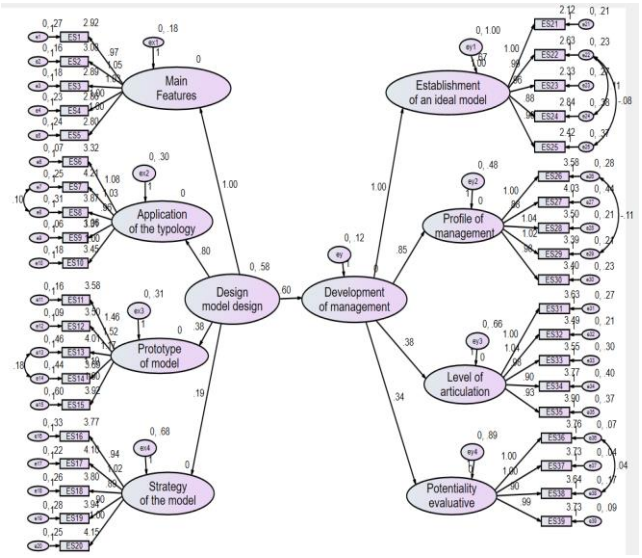

Fig. 4. Diagram of Non-Standardized Load Values.

The model with the correlations created in the described errors, by suggestion shows 693 degrees of freedom, which is obtained from a different number of parameter equal to 780 and a different number to parameter to estimate 87 obtaining 693 of difference (780-87=693), the changes that were made in this model in a definitive way, the structure equation that shows the values of adjustment measures, the results of the adjustment measures of the model of the structural equations of the variables of the present investigation are obtained, it will be possible to verify that it fulfills the majority in good adjustment of model that specifies CFI= 0. 951, IFI= 0.951, TLI=0.947, NFI=0.907, all complying with the norm of being equal to or higher than 0.9 and including X^2 = 2.003, which has a value between 2 and 5, by which, the model allows to obtain a good quality can be appreciated in Table VII.

Fig. 5 shows the diagram of improved specific values with unstandardized loadings. It can be seen that it has a value greater than 0.5, from the latent variable to the observed variable, therefore, it presents an acceptable factorial loading.

TABLE VIII. STATISTICS OF MODEL FIT MEASUREMENT INDICATORS

Statistics of model fit measurement indicators		
Absolute adjustment measures		
X^2	Chi cuadrado y nivel de significancia (p)	1376.142
GFI	Goodness of Fit index	0.840
RMSEA	Root mean square error of Appoximation	0.052
NCP	Nocenttrality Parameter	689.142
RFI	Relative fit index	0.899
ECVI	Expected cross-validation index	4.199
RMR	Root mean square residual	0.096
Incremental adjustment measures		
AGFI	GFI Adjusted goodness of fit index	0.818
CFI	Comparative fit index	0.951
IFI	Incremental fit index	0.951
TLI	Tucker Lewis index	0.947
NFI	Normed fit index	0.907
Parsimony adjustment measures		
X^2	Normalizada X^2 / d.f.	2.003
PNFI	Parsimony normed fit index	0.841
PGFI	Parsimony goodnee of fit index	0.739
Others		
AGFI	Índice de bondad de ajuste corregido	0.818

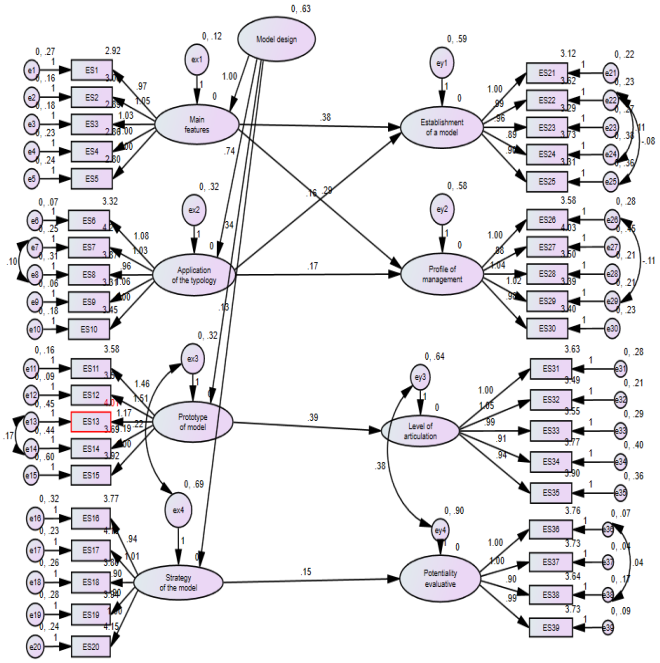

Fig. 5. Data Taken by AMOS software Version 24.

The detail of structural equations of the specific model considering X1: Main characteristics of the business management of industrial SMEs; X2: Generate the typology of industrial SMEs; X3: Prototype of integral system model; X4: Strategy of the proposed integral model through its business application; Y1: Establishment of an ideal model; Y2: Profile of business management; Y3: Level of articulation of variables and cause-effect relationships; Y4: Evaluative potentiality of its parameters in an exact manner, can be seen in Table VIII.

TABLE IX. SPECIFIC EQUATION MODEL

Integral system model plan indicators
X1 = 0.917 (X) + 0.119
X2 = 0.721 (X) + 0.323
X3 = 0.429 (X) + 0.321
X4 = 0.120 (X) + 0.688
Y1 = 0.373 (X1) + 0.589
Y2 = 0.301 (X1) + 0.582
Y3 = 0.292 (X3) + 0.640
Y4 = 0.129 (X4) + 0.900

E. Specific Hypothesis

In the specific hypothesis test of the result base of the specific theoretical model of structured equations, in the research methodology allows to obtain the data for a better interpretation of the specific hypothesis test, it will be based on the equation of the research methodology of the equations of the following table, it can be observed in Table IX.

TABLE X. REGRESSION FOR HYPOTHESIS TESTING OF SPECIFIC STRUCTURAL EQUATION

Hip.	Y = λX + Error		**λ**	**C.R.**	**P**
	(λ Non-standardized)		**Standardized**		
H1	Y1 ← 0.353 (X1) + 0.340		0.051	6.677	***
H2	Y2 ← 0.173 (X2) + 0.165		0.050	3.302	***
H3	Y3 ← 0.246 (X3) + 0.331		0.075	4.413	***
H4	Y4 ← 0.180 (X4) + 0.210		0.062	3.37	***

From the results obtained from the regression line of the structural equation model H1, H2, H3 and H4, a positive standardized loading greater than 0 is observed, validating the base of the equation $p<\alpha$ (α=0.05) can be verified, for which, the hypothesis (H0) is rejected and the alternative hypothesis (Ha) is accepted. It allows specifying if there is influence between the independent and dependent variables.

V. CONCLUSION

The main contribution of the research allows building the design of the innovation management model as a source of business competitiveness of industrial SMEs, which is strictly related to the hypothesis in alignment with the objectives of the problems posed in this research.

a) H1 was tested, therefore, it can be stated that the main characteristics of the business management of industrial SMEs and the establishment of an ideal model there is a highly significant direct relationship between the variables.

b) H2 was tested, therefore, it can be stated that the application of the typology of industrial SMEs improves the

profile of business management. There is a highly significant direct relationship between the variables.

c) H3 was tested, therefore, it can be affirmed that the prototype of the integral system model improves the level of articulation of the variables of cause-effect relationships. There is a very significant direct relationship between the variables.

d) H4 was proved, therefore, it can be affirmed that the strategy of the proposed integral model through its business application improves in evaluative potentiality of its parameters in an exact way. There is a very significant direct relationship between the variables.

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