

The Culture of Innovation in Women-Led Companies

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Abstract. The objective of this study was to analyze the elements of the culture of innovation in women-led companies in the state of Durango, Mexico. A quantitative, descriptive, cross-sectional, and non-experimental study was conducted. A convenience sample of 37 companies was selected, characterized as non-probabilistical and non-randomized, which allowed the sample to be constructed based on the accessibility and availability of the companies. The innovative culture was studied based on the analysis of four factors: 1) Intention to Innovate, 2) Infrastructure of the Innovation, 3) Influence of the Innovation and 4) Implementation of the Innovation. These factors encompass a total of seven dimensions that are structured into a total of 70 questions. The collected data was organized and entered into a database created in SPSS 25.0 software for statistical analysis. Tests of reliability, normality and validity of the data such as the Cronbach's Alpha test, the Kolmogorov-Smirnov test and the Kruskal-Wallis analysis were applied. The main findings indicate that the most frequent factors are 1) Intention to Innovate, in the Organizational Constitution dimension and 2) Infrastructure of the Innovation, in the Organizational Learning dimension. On the other hand, the dimension with the least frequency was Propensity to Innovate, included within the Intention to Innovate factor. This suggests that the analyzed organizations prioritize the standardization of procedures and work methods over actions aimed at innovation. Since a culture of innovation requires the ability and actions to create or improve products and services, the women entrepreneurs surveyed had a lower propensity to innovate. This suggests they prioritize standardization of procedures and work practices over encouraging flexibility and openness to new ideas and human capital.

1 Introduction

As of 2023, women represent 41.6% of the economically active population in Latin America and the Caribbean. According to the FOMIN and Young study in 2014, the average rate of entrepreneurial activity among women in the region is 15%, of which 71% start businesses out of opportunity and 29% out of necessity. In recent decades in Latin America and the Caribbean, women's participation has increased, both in the educational and the labor field sectors [1].

According to the World Economic Forum, in 2017 the gender gap in Latin America and the Caribbean was 30%, a level similar to that of Eastern Europe, Canada and the United States (28%), but higher than that of Western Europe (25%) [2]. For women in Latin America and the Caribbean, balancing professional and family responsibilities presents a challenge to consolidate themselves in the workplace, in addition to the salary and gender gaps that exist in the region [3]. In Latin America and the Caribbean, women hold 30% of leadership positions, and 35% of companies do not have any women in such positions [4]. The above data adds to previous studies that show that the low participation of women has a significant economic cost, both for companies and for countries, due to the underutilized potential [5-7].

Small and Medium Enterprises (SMEs) led by women in Latin America are of great importance for economies, however, unlike companies run by men, they still face inequalities in access to opportunities, gender stereotypes and discrimination [8-9]. Various studies have demonstrated the positive impact of women-led companies on Gross Domestic Product (GDP) growth. This is primarily due to their contribution to family and community economies, as well as their investment in resources for education and health, in addition to their economic impact and job creation [8-11].

Most female-owned companies are founded primarily out of economic necessity, coupled with the need for flexibility to accommodate family and childcare responsibilities. These companies are microenterprises (with between 5 and 10 employees) and face issues such as low productivity, slow growth, and lower levels of capital, physical resources, and human capital [8, 12-14]. Women-led companies typically operate in the informal sector within the domestic environment, with no clear division between their home and business, often employing family members [15].

Given the growing role of women in the economies of countries, it is essential that women participate broadly and equitably, not only at the business level, but also in activities related to science, technology, and

innovation [16]. Some studies suggest that companies with a high level of gender parity have innovation rates five times higher, and their innovation expenditure (as a percentage of their sales) is three times greater compared to companies with larger gender gaps [16].

For Mexico, gender inequality persists in the labor and educational sectors. BID estimates that the country could benefit from a 17% to 20% increase in scientific productivity if there were greater female participation in both areas [16].

In a study on the competitiveness of micro, small, and medium-sized enterprises (MSMEs) led by women in Mexico City, it was found that these are small in size, focused on the commerce and service sectors, lack legal status, and their use of technological tools is still in its early stages; however, among their strengths, we can find reinvestment of profits, the constant search for new business opportunities, and the fact that more than half maintain a stable business despite low income levels [17].

Women-led businesses contribute to the creation of new job opportunities, and countries with a higher number of female entrepreneurs show higher levels of development [18]. BID states that, given the importance of Science, Technology, and Innovation in Latin America and the Caribbean as essential pillars for socio-economic development, it is crucial that women have an active and full participation [16]. In this regard, innovation plays a crucial role in maintaining a competitive advantage for businesses, as it provides a pathway to offering higher quality and a greater variety of products and services, as well as increasing market share.

This study is relevant as it will offer insights into the culture of innovation and the propensity to innovate within women-led companies in Durango. The objective is to analyze the factors influencing the culture of innovation in these businesses throughout the state. The aim is to provide an overview of fostering a culture of innovation to understand its characteristics, elements, and the most influential factors affecting the propensity to innovate.

The article is structured into three sections: the first offers a review of the literature, the second outlines the methodology used, and the third presents the results and discussion. The article concludes with a summary of the study's findings.

2 Discussion of the literature

According to Schumpeter's conception, 'innovation is doing new things, or doing things that are already being done, but in a different way' [19]. Innovation encompasses not only new products and processes but also new forms of organization, new markets, and new sources of raw materials [20]. In the conceptualization of the term innovation, an international reference is the Oslo Manual, published by the Organisation for Economic Co-operation and Development (OECD) and Eurostat, stating that innovation is considered a driver of productivity, economic growth, and well-being [21]. Authors like Michael Porter have highlighted the value

of innovation as a means to maintain and create competitive advantages in organizations. It is considered a strategic element that impacts economic outcomes and business growth [22]. According to Flores [23], innovation is an unavoidable path that companies must follow to access new opportunities for progress. The process of organizational innovation can influence the industry sector and the progress of countries by opening up new markets resulting from innovation processes

In the fourth edition of the Oslo Manual, published in 2018[21], a recent definition of the concept of innovation is presented, where an innovation is a new or improved product or process (or a combination of both) that differs significantly from previous products or processes and has been made available to potential users (products) or implemented within the organization (processes) [21].(OECD & Eurostat, 2018). For the purpose of this study, innovation will be analyzed from the perspective of a process that contributes to the strengthening of organizational culture and thus its impact on the innovative capabilities of enterprises, which will be reflected in the creation of new products and services.

The OECD, in the various editions of the Oslo Manual, proposes four types of innovation: 1) product innovation (goods or services), 2) process innovation, 3) marketing innovation, and 4) organizational innovation [21,24].

In contrast, the Frascati Manual defines innovation as a process that encompasses various scientific, technological, organizational, financial, and commercial stages, including investments in new knowledge. This set of activities culminates in the implementation of new or improved products and processes [25].

Social, philosophical, and even political innovations have also been identified [26-27].

Regarding the level of complexity of innovation, incremental and radical innovations are identified, both for products and processes. Each type impacts the market, with radical innovations having an impact on technological waves that bring about significant changes in how things are done, and can even be subject to patents. Incremental innovations, conversely, represent improvements to current processes or products [28].

In the conception of innovation, the culture of innovation is fundamental. This culture is composed of a set of knowledge, practices, and values (both individual and collective) that determine dispositions and ways of doing things and promote the generation of new knowledge and the creation of innovations [29]. Culture has particular characteristics in each organization; it is shaped by values, attitudes, and customs that influence and determine certain behaviors and learning processes, which can either facilitate or hinder innovation processes. Therefore, the management and promotion of the culture of innovation should be outlined in the organization's strategy and top management [23].

In the culture for innovation, workers and productive activities within organizations are key elements, which together channel actions to materialize innovations. This is because human capital has the experience and

capabilities to create and apply knowledge to respond to the market and competition in which companies operate [30-31].

According to Flores [23], establishing a culture of innovation in a company also requires elements of recognition for employees: i) for proposed ideas, ii) to encourage values and attitudes in favor of innovation, iii) to create mechanisms for constant adoption and change, iv) for resilience in the face of obstacles, failures, and challenges, as well as v) to stimulate the integration of different forms of knowledge and individual and collective creativity.

In this regard, [29, 32] suggest that to strengthen the culture of innovation, leadership, flexibility, motivation, and mechanisms for participation, collaboration, and teamwork are essential, especially for continuous learning and the conception of ideas. In addition, [33] suggest that some of the main barriers for innovation and, consequently, for the conception and establishment of a culture of innovation are stagnation and resistance to change. To successfully foster a culture of innovation, it is essential to promote collaboration and collective thinking at all levels of the organization, while encouraging cooperation and values that drive innovation within a sustainable environment [23].

According to the Oslo Manual [21], some obstacles to achieving a culture of innovation are related to human capital, mainly due to a lack of skills needed to develop and manage innovative processes, resistance to change, and a lack of openness to continuous improvement. Additionally, there are obstacles associated with cultural aspects such as religion, traditionalist customs, and limited access to education, particularly scientific and technological [34]. Lastly, some limitations to the conception of a culture of innovation are related to rigid organizational structures, with limited openness to direct and open communication, and without policies that encourage creativity and the generation of ideas to solve operational, organizational, and technical problems [35].

The strengthening of a culture of innovation goes hand in hand with promoting participative leadership, incentives for innovation, effective innovation management, work in multidisciplinary teams, tolerance for change and failure, and even the use of information and communication technologies that facilitate collaborative work.

3 Methodology

A quantitative, descriptive, cross-sectional, and non-experimental study was conducted on women-led businesses in the state of Durango (Mexico), belonging to the Asociación Mexicana de Mujeres Jefas de Empresa A.C. (AMMJE) [Mexican Association of Women Entrepreneurs] The study's focus was to analyze the culture of innovation through the use of an e-questionnaire during the year 2022. The way to reach the companies was through the board of directors of the association. The inclusion criteria required that the business owner be a woman, with the business being of any size—micro, small, medium, or large—and from

various productive sectors, including services, trade, or manufacturing. A convenience sample of 37 companies was selected, characterized as non-probabilistical and non-randomized, which allowed the sample to be constructed based on the accessibility and availability of the companies. Once the information was collected, a descriptive statistical analysis was conducted to validate the construct.

The data collection instrument was a questionnaire designed by Dobni and validated by Rubio and Garzón Realpe [36-38]. This instrument is developed in a multidimensional context and comprises four factors: 1) intention to innovate, 2) infrastructure of the innovation, 3) influence of the innovation, and 4) implementation of the innovation. The four factors encompass seven dimensions for measuring the culture of innovation. These dimensions are represented in 70 questions in the Culture of innovation Questionnaire.

Table 1. Factors and Dimensions of Culture of innovation.

Factor	Dimension	Definition
Intention to innovate	Propensity to innovate	Generate new knowledge to develop the creation of new products and/or services, the improvement of existing products, or changes in business processes, and the role of employees in this process [39].
	Organizational constitution	Determine the individual and group relationships within the organization. At this point, Paredes and Velasco [40] helps to understand the level of employee commitment in relation to leadership, strategic initiatives, and similar factors. According to Cornejo & Muñoz [29], leadership is fundamental for an culture of innovation, as it sets the mechanisms, pace, direction, and also generates motivation. Leadership in innovation involves risk, persistence, entrepreneurship, but also tolerance for failure and resilience.
Infrastructure of the innovation	Organizational learning	It includes the capabilities and skills of employees. It focuses on the conception of individual, group, and organizational knowledge for the generation of new capabilities [41]. The learning process for innovation must be interactive, which involves building a series of relationships, fostering participation, and disseminating knowledge among the agents involved in innovation [29].
	Creativity and employee empowerment	It allows for understanding the creative capacity of employees in their work area and their decision-making skills [42,30].
Influence	Market orientation	It is the knowledge about market behavior and perception, customer

of the innovation		satisfaction, and competitors [42-43].
	Value orientation	To analyze how employees contribute to generating added value for customers [42].
Implementation of the innovation	Implementation Context	It examines the company's ability to align new ideas and improvement actions with changes in the competitive environment and to propose enhancements [42].

Source: Own elaboration

The questions were designed using a Likert scale, with values ranging from one to five points, with the options: strongly disagree (1 point), disagree (2 points), neither agree nor disagree (3 points), agree (4 points), and strongly agree (5 points). Once the data was collected, it was organized and entered into a database created in SPSS 25.0 software for statistical analysis.

3.1 Reliability, Normality, and Validity Tests of the Data

One of the applied tests was Cronbach's Alpha. According to Domínguez-Lara [44], it is a percentage expression of variance attributed to true variance and also determines what percentage is attributed to measurement error variance. Other contemporary authors consider that the reliability criterion for a measurement instrument should be a Cronbach's Alpha indicator greater than 0.700 [45-46] The results of this test are shown in Table 2.

Table 2. Cronbach's Alpha of the Measurement Instrument

Cronbach's alpha	Number of elements
.983	70

Source: Own elaboration, based on results from SPSS 25.0

The result of the Cronbach's Alpha reliability analysis applied to the measurement instrument indicates a high degree of reliability. According to George & Mallery and Ventura-León & Peña-Calero [47-48], as the result approaches 1.000 (one), the internal consistency of the measurement instrument is determined through a correlation between its items. This means that the instrument used in the present research is reliable.

Subsequently, a normality test was applied using the Kolmogorov-Smirnov analysis, which allows for determining the degree of fit to a normal distribution and, therefore, the possibility of proceeding with parametric tests. Some dimensions of the culture of innovation show non-parametric behavior, meaning they are not favorable concerning the normality of the results, as indicated by significance values greater than 0.050.

The significance values of three out of the seven dimensions of culture of innovation indicate that they do not follow a normal distribution (they are greater than

0.050). For this reason, it is necessary to conduct non-parametric tests such as Kruskal-Wallis, which will allow for determining the validity of the results according to non-parametric distributions.

Kruskal and Wallis [49] provided a rank-based test that is robust and reliable for the k-sample problem, serving as an alternative to parametric approaches, specifically equivalent to the one-way analysis of variance (ANOVA) [49]. Thus, the Kruskal-Wallis test has been used as an important statistical analysis tool for samples with non-parametric behavior, which is why it is employed in the present study. The goal is to analyze the significance levels to determine the validity of the responses obtained from the measurement instruments, which must show significance levels below 0.050 to be considered valid. This data is shown in Table 3.

Table 3. Kruskal-Wallis analysis.

	C.I.	O.C.	O.L.	M.O.	I.P.	V.O.	C.E.
Asymptotic significance	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Own elaboration, based on results from SPSS 25.0

C.I. Context of Implementation

O.C. Organizational Constitution

O.L. Organizational Learning

M.O. Market Orientation

I.P. Innovation Propensity

V.O. Values Orientation

C.E. Creativity and employee empowerment

Table 2 shows, through significance values below 0.050, that the results obtained from the applied measurement instruments are valid, which is why they are presented below.

3.2 Causal Analysis

To determine which of the previously mentioned dimensions has the greatest impact on the culture of innovation, it is necessary to perform a causality analysis through linear regression. To conduct this analysis, a linear regression model was calculated using the ordinary least squares technique to determine the dependency relationship of the predictor variable (Element of the culture of innovation) on the dependent variable (Innovation). According to Hair, Anderson, Tatham, & Black [50], this is a versatile technique for understanding the relationship between variables.

The formula for simple linear regression in SPSS follows the standard form of the linear regression equation, which is as follows:

$$Y = \beta_0 + \beta_1 X + \epsilon$$

Where:

- **Y** is the dependent variable (the one you want to predict or explain).
- **X** is the independent variable (the predictor).
- **β_0** is the intercept, which is the value of Y when X=0.
- **β_1** is the regression coefficient, indicating the change in Y for each unit change in X.
- **ϵ** is the error or residual, reflecting the variability in Y that is not explained by X.

4 Results and Discussion

First, it is necessary to characterize the surveyed population to understand its general characteristics. The sociodemographic results show that 43% of women who are business owners are over 50 years old, single (45%), have a bachelor's or postgraduate degree (86%), and have prior work experience before starting their own business (76%). Furthermore, mothers with two children predominate (41%), as well as women who have support to carry out household duties (68%). 59% of them started their businesses because they identified a need for a product or service in the consumer market, and 54% believe that the main barrier to entrepreneurship is the lack of financing. The average age of the companies is 18 years, with a standard deviation of 13 years.

To address the research objective, which is to analyze the elements of culture of innovation in the companies under study, Table 4 presents descriptive statistics of the results obtained based on the dimensions that make up the culture of innovation.

Table 4. Descriptive Statistics of the Culture of innovation Dimensions

	CI	O.C	O.L	M.O	LP	V.O	C.E
Intensity	3.97	4.34	4.09	4.19	4.04	4.2	4.2
Standard deviation	0.60	0.55	0.64	0.60	0.80	0.69	0.70
Frequency	5	12	6	4	1	5	4

Source: Own elaboration

Table 4 shows that the dimension most frequently observed in the companies under study is Organizational Constitution, both in terms of intensity and frequency. It also has the lowest standard deviation, indicating a high concentration of data around this dimension. As previously explained, Organizational Constitution represents the degree of group and individual commitment of employees to the leader's business vision and strategy, which aligns with the conclusions of the study [51], which determines that visionary leadership is characterized by sharing vision, strategies, and objectives with collaborators, which increases their level of commitment by 20.3% in the cognitive dimension, 36.5% in the affective dimension, and 27.5% in the behavioral dimension. These three dimensions constitute the organizational commitment variable [52].

It can also be observed that the dimension that ranks second in frequency is Organizational Learning, which focuses on the generation and dissemination of knowledge within the organization. This represents the willingness of businesswomen to promote the transfer of operational knowledge to employees, with the aim of fostering improvements in performance; However, if it is excessive, it can lead to organizational rigidity, which inhibits innovation.

Alternatively, among the dimensions of culture of innovation, it is observed that the one with the lowest frequency index and the second lowest intensity indicator is Innovation Propensity, which, in the original

theoretical model, is the main determinant of innovation, as it enables the development of new products or services according to the Oslo Manual.

Table 5 shows the results of the linear regression model using the ordinary least squares technique to calculate the dependency relationship of the predictor variable (Element of the culture of innovation) on the dependent variable (Innovation).

Table 5. Linear Regression Results

Model	Beta	Sig.
(Constant)		0.079
Context of Implementation	0.144	0.000
Organizational Constitution	0.133	0.000
Organizational Learning	0.153	0.000
Market Orientation	0.144	0.000
Innovation Propensity	0.192	0.000
Values Orientation	0.165	0.000
Creativity and employee empowerment	0.168	0.000

Source: Own elaboration

The first indicator to analyze in Table 5 is significance, which should be less than or equal to 0.050. This indicates the correspondence of the model, that is, the influence of the predictor variable (element of the culture of innovation) on the dependent variable (innovation). In this case, it is observed that the determining dimension of the culture of innovation is the so-called Innovation Propensity, which involves the organization's ability to generate knowledge that enables the development of new products or services, the creation of new processes, or even changes in the way employees collaborate within the organization to maximize performance and optimize company resources.

This significantly differs from the results observed in Table 3, where Organizational Constitution is the dimension with the highest frequency and intensity within the companies under study. However, it is the dimension that contributes the least to the development of the culture of innovation in the companies under study, which indicates that businesswomen focus their efforts on the formalization, specialization, and centralization of their procedures, leading to the mechanization of their organizations in structural terms. This inhibits innovation, as the rigidity of the company prevents rapid adaptation to highly dynamic and volatile markets resulting from globalization and the COVID-19 pandemic.

In contrast, Innovation Propensity, being the dimension with the greatest influence on the culture of innovation according to Table 4, is less prevalent in the organizations under study. Innovation Propensity arises from the detection of needs and business opportunities; however, this is currently not considered a priority for the analyzed companies. Evidence of this is that the items with the lowest scores in the administered questionnaire are:

- We have an extensive base of resources (infrastructure, materials, labor) in our organization concerning innovation.
- We allocate measurable resources (human and financial) to our innovation strategy.
- We are willing to suspend services that only serve secondary purposes in our efforts to build capabilities for new services.
- We have a strong track record of launching new service offerings.
- We quickly transform ideas into marketable services.

Each of these indicates a difficulty with innovation, particularly in being a flexible company that can quickly adapt to the market in which it competes. This demonstrates that organizational structure is overly rigid, with organizations being highly mechanized. Consequently, innovation becomes a significant challenge, as it involves breaking deeply ingrained work patterns within the current culture of these companies.

According to the above, it can be asserted that organizations wishing to promote innovation in their products and processes must create the right tools to foster a creative environment that stimulates intellectual engagement, following the transformational leadership model [53], which suggests that the leader of these companies should encourage and allow their employees to make decisions related to their roles and even promote the creation of new ways to solve problems and thereby develop new procedures or products that can meet consumer needs [53]. The results could be explained by the idiosyncrasies and demographic characteristics of women entrepreneurs, which suggest that they seek to have control and centralization of decision-making. This limits the openness and involvement of employees in generating new ideas, products, and improvements, which could bring them closer to building a culture of innovation in their business activities and market orientation.

5 Conclusions

The organizations analyzed in this research prioritize the standardization of procedures and work methods, which are characteristics of organizational structure, but which turn the organization into a rigid and mechanical company similar to the models established [54-56].

The development of a culture of innovation requires capabilities and actions that enable the creation or improvement of products and services. In the case of the businesswomen under study, it is observed that they have a low propensity to innovate, this shows that the analyzed organizations prioritize the standardization of procedures and ways of working and not towards actions that would make them flexible organizations with an open attitude towards new ideas from their human capital.

The factors that appeared most frequently in the results were Intention to Innovate and Infrastructure of the Innovation. The dimension that is most prevalent in the companies under study is Organizational Constitution, both in terms of intensity and frequency, and it also has the lowest standard deviation, which

implies a high concentration of the data around this dimension. Organizational Constitution represents the level of both group and individual commitment of employees to the leader's vision and strategy. The dimension that appears next is Organizational Learning, which suggests that companies show internal progress in generating knowledge that could allow them to create new capabilities and learning processes that pave the way for innovation.

The studied companies need to work on building a culture where innovation is part of their daily activities and allows them to leave behind the standardization and centralization of decisions, according to Schumpeter in what he called "creative destruction" applying changes in routines and processes so that new mechanisms are systematically developed, which will allow the organization to build innovation capabilities to respond to a dynamic, competitive and global market.

The main limitation of this study was having access to the companies. Despite the fact that the AMMJE member list is 102, only 37 answered the questionnaire due to the availability of the businesswomen to participate.

For future research, a comparison could be made between the culture of innovation in companies led by men and those led by women, along with an exploration of the relationship between the demographic characteristics of businesswomen and the factors influencing the culture of innovation.

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