

Knowledge Management and Human Resource Management to Innovate: An Empirical Analysis in the Textile Industry

Gestión del conocimiento y gestión del recurso humano para innovar: Un análisis empírico en la industria textil

Jaime Apolinar Martínez-Arroyo

*Universidad Michoacana de San Nicolás de Hidalgo,
México*

jmartinez@umich.mx

 <https://orcid.org/0000-0002-9926-4801>

María Francisca Peñaloza Talavera

*Universidad Michoacana de San Nicolás de Hidalgo,
México*

0502569x@umich.mx

 <https://orcid.org/0000-0003-1282-8203>

Marco Alberto Valenzo Jiménez

*Universidad Michoacana de San Nicolás de Hidalgo,
México*

marco.valenzo@umich.mx

 <https://orcid.org/0000-0001-6155-5948>

Flor Madrigal Moreno

*Universidad Michoacana de San Nicolás de Hidalgo,
México*

fmadrigal@umich.mx

 <https://orcid.org/0000-0003-4011-0178>

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Abstract

This research aims to understand the impact of knowledge management and human resource management on innovation in textile industry companies in central-western Mexico. This is a qualitative, descriptive, correlational study with a non-experimental, cross-sectional design. The sample is simply random and is made up of 386 companies in the textile industry. A structured questionnaire was applied using a Likert-type scale with five ranges. The information analysis used the Structural Equation Model (SEMPLS). In the results, the analysis of the statistical parameters t – t -student and p -value confirm the statistical significance of the Path coefficients with 95% confidence. The results of the research coincide with some of the literature. This research fills a gap in the literature on the phenomenon studied.

JEL code: L6

Keywords: Innovation, Knowledge Management, Human Resource Management, Textile Industry.

Resumen

El objetivo de esta investigación es, conocer el impacto de la gestión del conocimiento y la gestión del recurso humano en la innovación de las empresas de la industria textil de la zona centro occidente de México. Es un estudio cualitativo, descriptivo y correlacional, de diseño no experimental y corte transversal. La muestra es aleatorio simple y está conformada por 386 empresas de la industria textil. Se aplicó un cuestionario estructurado, con escala tipo Likert, con cinco rangos. El análisis de la información se utilizó el Modelo de Ecuaciones Estructurales (SEMPLS). En los resultados, el análisis de los parámetros estadísticos t–student y p–value confirman la significancia estadística de los coeficientes Path con un 95% de confianza. Los resultados de la investigación coinciden con alguna de la literatura. Esta investigación llena un vacío en la literatura, sobre el fenómeno estudiado.

Código JEL: L6

Palabras clave: Innovación, Gestión del conocimiento, Gestión del recurso humano, Industria Textil.

INTRODUCTION

The role of knowledge management, human resources management, and innovative performance within textile firms enhance the organization's performance. The textile industry has become a critical component of the global economy and daily life. Consequently, an assessment of input utilization that considers innovation, technology, and efficacy is imperative (Haider & Anees, 2024).

The textile industry employs tens of millions of people worldwide and is one of the global industries that provides basic daily human needs. In 2021, the global textile industry generated more than 1.04 trillion dollars (Harsanto et al., 2023). For example, the textile and clothing sector is essential in the European manufacturing industry, generating a turnover of 166 billion € and employing 1.7 million people (Idiano D'Adamo et al., 2024). Now then, globalization provides access to practically all textiles traded worldwide.

While beneficial for consumers, globalization poses challenges for the textile manufacturing industry. It is essential to mention that the textile industry was undoubtedly one of the first sectors to be affected by the effects of globalization. Today, the textile industry's great and main strength is and will be its capacity for resilience and recovery. However, more is needed to innovate and evolve for the future because success is limited in time (De Jesus, 2024).

Following the above, Rui Dantas (2024) highlights a significant uptrend in research on the technological integration of Industry 4.0 within the textile sector. Key focus areas include automation, IoT, and intelligent manufacturing, reflecting a paradigm shift towards more adaptive, predictive, and self-optimized production processes. The analysis also reveals a geographical concentration of research activity, particularly in Asia and Europe, with China and the UK leading in output and international collaboration, respectively (Dantas, 2024).

The textile industry is one of the most polluting sectors. Therefore, in addition to the impact of global competition demanding continuous innovation, adopting a sustainability strategy is necessary to reduce its adverse environmental effects. Competitiveness in the textile industry hinges on sustainable innovation (Martins, 2024).

Analyzing efficiency in the textile and clothing industries aims to generate knowledge that can strengthen theoretical understanding and practical results in industrial economics and business management. Research into the issue involves analyzing the multifaceted factors involved in efficiency, such as technological innovation, levels of investment in research and development (R&D), the types of production methods adopted, and market dynamics (De Moraes e Soares et al., 2024).

Innovation is essential in companies of all sizes and all regions. This research studied companies in the textile industry in Mexico's central-western area. In this territory, micro, small, and medium-sized companies predominate (90.98% micro, 7.28% small, 1.41% medium, and 0.30% significant) (INEGI, 2022), which, due to their size and the evolutionary and interactive nature of the innovation process, are characterized by carrying out, involves mainly gradual innovations based on the knowledge previously available in the company. Organizations also introduce radical innovations, but to a lesser extent, due to the high economic effort required for their development. For this reason, this type of innovation has acquired a secondary role in the study area.

It is well recognized that technological innovation plays a crucial role in the development of the textile industry system. As the innovation process evolves, the extent of technological dissemination and the competitive balance within the textile industry also shift, resulting in fluctuations in the industry's economic growth. These fluctuations, driven by innovation, are complex, irregular, and only partially cyclical.

Likewise, recent studies have highlighted the increasingly significant relationship between innovation in the textile industry and sustainability. Chourasiya and others (2024) emphasize a lag in technology adoption, particularly in developing countries, despite advances in sustainable practices to reduce environmental impacts

(Chourasiya et al., 2024). Dominidiato and others (2024) explore how innovation fosters interdependent supplier-customer relationships, focusing on product durability and recyclability, which are crucial to achieving sustainability goals.

Harsanto and others (2023) provide a systematic review indicating an increasing focus on green innovations, such as eco-design and cleaner production, driven by consumer demand and regulatory pressures. Consequently, the textile industry should implement initiatives to reduce the perceived gap between fashion and sustainability as an innovative action. Such initiatives could include using recycled materials, reducing CO2 emissions, and conserving water or energy (Grazzini et al., 2021). In addition, companies must pay close attention to consumer demands (Pencarelli et al., 2020).

In this new scenario, traditional manufacturing sectors, such as the textile industry, face changing times. Textile companies must transition from machine-dominated manufacturing to digital manufacturing. This sector relies on product customization and short manufacturing cycles. However, the textile industry mainly comprises small and medium-sized enterprises (SMEs) with limited capacity to invest and adopt new production technologies. The new paradigm includes productive modular structures composed of devices in the Internet of Things environment. Robotic tasks can be used in the autonomous or collaborative assembly of clothing sets and the unfolding of garment pieces.

SMEs in the textile sector can benefit from technological innovations in cloud computing for intelligent clothing, fabric customization, production line control, mass customization, store programming, efficiency improvement, and environmental pollution reduction. This production approach requires new business models, increased management capabilities, and updated physical infrastructure. Preface information technologies in companies enable the management of distributed resources (employees and equipment) to interact remotely with each other (Martins, 2024).

After the above, this study aims to comprehensively investigate the role of knowledge management and human resource management as crucial drivers of innovation in textile companies in the central-western region of Mexico. The study seeks to examine the academic perspective, identify trends, and unravel patterns related to knowledge management and human resource management and their relationship with innovation in the textile industry.

This article contributes to the study of innovation in textile companies in three ways. First, the specific impact of knowledge and human resources management on innovation was theoretically developed and verified through empirical research. Second, it was found that it is necessary to acquire knowledge, but it is not only about acquiring it; the actual value of knowledge is obtained through its correct management to use it in activities that lead to some innovation. Third, the study reveals that the human part of the company also turned out to be a significant variable for innovation because the human being is the one who possesses the skills and capacities to make innovation possible; he is the source of creativity. In that sense, one can only speak of business innovation with proper human resource management.

The work is divided as follows. Section 2 proposes a review of the literature on the relationship between knowledge management and human resources management with innovation. Section 3 includes the methodology of this work, based on the analysis of information with the Smart-PLS software. Section 4 proposes the results obtained from the measurement with the software above. Section 5 presents the discussions and implications of this work. Section 6 includes the conclusions drawn from this work.

THEORETICAL FRAMEWORK

Innovation

This study focuses on the relationship between Knowledge Management and Human Resources Management as a strategic source of innovation in the textile industry in the central-western area of Mexico. Innovation has been a central theme in research. Therefore, the literature analysis reveals a clear upward trend

in academic interest in innovation within the textile industry, with a notable increase in publications (Mata, 2024). Various perspectives have emerged when addressing the issue of Innovation within the realm of business activities. Among these perspectives, industrial economics offers insights into different industries based on their approach to Innovation (Dominidiato, 2024).

According to Vlasova and others (2024), critical external factors for Innovation are mentioned. While remaining beyond the control of company management, these factors significantly affect management decisions regarding implementing innovations. A productive environment for innovation is defined by geography (company location), market parameters, knowledge dissemination and exchange mechanisms (human resources, availability of financial resources, and infrastructure), specific features of government regulations, and the public sphere (Vlasova et al., 2024).

However, the need for constant renewal with new capabilities and valuable assets in an increasingly complex context represents an extraordinary challenge for companies. Finding new business models in today's increasingly complex context requires balancing multiple factors with multidirectional influences and higher-level competencies. One of the latest strategies is intrapreneurship, internal entrepreneurship in which innovations are generated and the company is constantly updated. Intrapreneurship is a type of entrepreneurship in which employees create new enterprises and are part of the parent company. Intrapreneurship is one of the critical mechanisms for generating the innovations that companies need to achieve sustainability in dynamic markets (Vivek & Chandrasekhar, 2024).

In this exact order of ideas, it makes sense to look at how innovation at the forefront is changing the face of the textile sector in the world today. The textile industry is embracing digitalization, advances in materials science, and advanced manufacturing technologies to produce clothing using sustainable and ethical methods efficiently. New technologies are modernizing traditional textile production, giving new impetus to developing related sectors and expanding its potential to increase its contribution to the national GDP. With the advent of new technologies, the variety of fabrics, materials, and textiles and their application areas are expanding.

The concept of sustainable textile production is being introduced, which involves minimal energy use in production and the possibility of recycling products at the end of their life cycle. There is a trend towards increasing the availability of environmentally friendly textiles and economic efficiency. Examples of eco-friendly technologies include fabrics made from bamboo and recycled waste. The technology of creating customized textiles is gaining momentum, allowing the customer to remotely select or develop various designs and print them on fabric. Smart computerized looms quickly create complex patterns, and laser scanners and computers create finished patterns without cutting the fabric (Meetei et al., 2024).

In summary, we expect a Textil Industry, internal resources, innovative capabilities, market environment, and external sources of knowledge to be important determinants of its decision to engage in innovation and translate these innovations into process outcomes (Wadho & Chaudhry, 2024).

KNOWLEDGE MANAGEMENT

Knowledge management can be seen as a science or practice of what is being implemented by policymakers in the industry (Ermini et al., 2024). The central object of knowledge management is knowledge, which is divided into implicit and explicit. Both are intellectual assets that collaborate to become human capital for the company or organization. In the textile industry (Baloyi et al., 2024), KM can be carried out by individuals, groups, or the organization itself and beyond (Petrillo et al., 2024). Implicitly, all models of knowledge management are to explain who the executor is. Explicitly, the player appears in KM-Nonaka. Knowledge management is implemented through a mechanism for continually obtaining or generating knowledge.

In the Nonaka model, for example, knowledge management consists of socialization, externalization, combination, and internalization. The knowledge management process is the company's ability and is believed

to be a precondition of practical implementation (Salina, 2012). In the context of the textile industry (Kitaw et al., 2024), knowledge acquisition derived from a marketing manager who obtains information from the buyer is studied, creating opportunities for the company (Nigatu et al., 2024). The customer is a business partner and is considered to have a more comprehensive knowledge of market demand in the country and abroad.

Moreover, according to the knowledge spillover, the acquisition is also due to exchanging knowledge with business partners. To produce targeted innovation performance, the company must manage knowledge appropriately acquired. Enterprises that manage knowledge effectively can be more innovative (Fibres & Textiles in Eastern Europe, 2020)

The role of knowledge management capabilities and innovative performance within textile firms enhance the organization's performance. The textile industry has become a critical component of the global economy and daily life. Consequently, an assessment of input utilization that considers innovation, technology, and efficacy is imperative. Because knowledge can no longer be obtained solely within organizational networks or national borders (Jegade & Muchie, 2024), undoubtedly, it is through internal cooperation that organizations gain access to a wide range of implicit and explicit knowledge within the organization. By strengthening internal engagement with the workforce, organizations gain knowledge of what, where, and to what extent information is stored within the organization.

Some researchers believe that (Attarpour et al., 2024) the potential to stimulate innovation within an organization exists through internal collaboration. There is a positive correlation between increased information sharing among employees and their increased capacity for innovation. Similarly, as a strategic form of enterprise R&D (Research and Development) activities, R&D models can be divided into internal R&D and cooperative R&D, depending on organizational boundaries and knowledge sources. Many studies have highlighted the importance of external knowledge sources for enterprise innovation and considered that cooperative R&D can effectively promote innovation performance (Zhang et al., 2020).

Likewise, previous studies have shown that KM enables firms to use current knowledge and expertise to develop incremental innovation and improve knowledge exploitation. Knowledge acquired from outside the firm significantly assists employees' creative behavior. Emerging consumer and business knowledge further develops employees' experiences, broadens their thinking, and advances innovative actions. Firms can encourage knowledge acquisition from external collaborators to promote RI initiatives, generate radical ideas, and create a creative environment that fosters performance and growth (Nabi et al., 2023).

Knowledge is the foundation that innovation needs. This can occur in all industries and companies, regardless of technological level (Piana & Brustolin, 2023). The stock of cutting-edge knowledge is essential in technology-intensive sectors and the learning of enterprises and organizations. Explicit knowledge can be expressed through words, data, documents, and other readable forms and transferred by common knowledge carriers, which are easy to understand and absorb. Tacit knowledge mainly refers to knowledge that exists in thought and is difficult to formalize.

Most of it is internalized as resources of organizations or individuals, which can be transferred and shared through language and communication, value influence, conferences, etc. It is necessary to emphasize that since innovation occurs in the field of knowledge, it helps improve the enterprise's performance. Therefore, knowledge transfer between enterprises refers to the transfer of knowledge from the knowledge owner to the knowledge recipient (Wang et al., 2024). Hence, collaborative efforts among stakeholders are needed to facilitate knowledge sharing, technology transfer, and capacity building to accelerate innovation in textile organizations (Chourasiya et al., 2024).

HUMAN RESOURCES MANAGEMENT

Human resource management (HRM) focuses on job design, improving employee problem-solving skills, reducing individualism, and increasing cooperation among members to develop innovative ideas that help teams complete tasks more efficiently. In addition, HRM allows enterprises to accurately train and evaluate the employee performance of well-qualified employees, enabling them to come up with innovative ideas and creatively apply these ideas to teamwork to increase innovation outcomes for the entire enterprise.

In addition, by participating in the decision-making process through open and honest discussions, HRM also helps strengthen the relationship between employees and managers. This allows employees' new ideas to be readily accepted and implemented by managers at work, thereby improving the innovation capacity of enterprises. When the relationship between employees and managers becomes cohesive, employees will have a sense of security and positive attitudes toward innovative behavior by forming and implementing new ideas at work. Therefore, enterprises with solid human resource management will create a foundation to promote innovative and creative ideas among employees (Nguyen & Dao, 2023). Human resource management's primary objective is to provide opportunities for superior work behavior to achieve sustainable competitive advantage, including innovative performance (Setyaningrum & Wulandari, 2024).

Managing human resources is more complicated than managing capital or technology. A flourishing human resource management (HRM) system is necessary for any business organization to manage its human resources effectively. Robust and creative HRM practices should support the business organization's HRM system. Business activities used to manage a group of human resources and ensure that those resources contribute to attaining organizational goals are alluded to as HRM practices. Signify the business practices directed at controlling the group of human resources and confirming that the resources are working towards achieving business objectives. Solid and innovative HRM practices should support the HRM system of the business organization. The fundamental aim of this paper is to examine the contribution of innovative HRM practices, including employee participation, performance appraisal, compensation, selection, training, and redeployment–retraining on firm performance (Aslam et al., 2023). In the relationship between HRM, innovation, and performance, HRM enhances innovation, while innovation positively contributes to business performance (Turulja et al., 2023).

METHODOLOGY

This research uses a qualitative study methodology, which is descriptive and correlational in scope, non-experimental, and cross-sectional in design. This methodology involves collecting and evaluating data to identify correlations, patterns, and trends between variables. In this case, we obtained quantifiable information on the relationships between innovation and the independent variables of Knowledge Management and Human Resources Management. The target population, Universe, was obtained considering a total population (N) of 29,712 companies, a confidence level of 95%, and a probability in favor of 0.5, the sample of 386 companies.

The instrument used for data collection was a structured questionnaire with closed questions, coded with a Likert scale, which was designed by dividing each question into five possible response alternatives: agree (5), agree (4), neither agree nor disagree (3), disagree (2), totally disagree (1), to which a score of 1 to 5 was assigned for better tabulation of the responses.

To explore complex interactions between observable and latent variables in a data set, the current research employs structural equation modeling using partial least squares (PLS-SEM), a statistical approach that combines factor analysis and regression. The construction of a measurement model, the evaluation of its validity and consistency, and the construction of a path model to analyze the association between unobserved variables are part of the study. PLS-SEM is resistant to non-normal data distributions and can handle a variety of sample sizes, making it ideal for exploratory research and theory building. In addition, it allows for the inclusion of formative and reflective measurement methods.

RESULTS

Figure 1 shows the designed SEM-PLS model. The Knowledge Management (KM) and Human Resources Management (HRM) variables are exogenous constructs that play the role of predictor variables, and the Innovation (INN) variable represents the predicted endogenous construct. In this case, the items are reflective indicators because they are expressed in terms of the construct; in other words, they are manifestations of the unobserved variable.

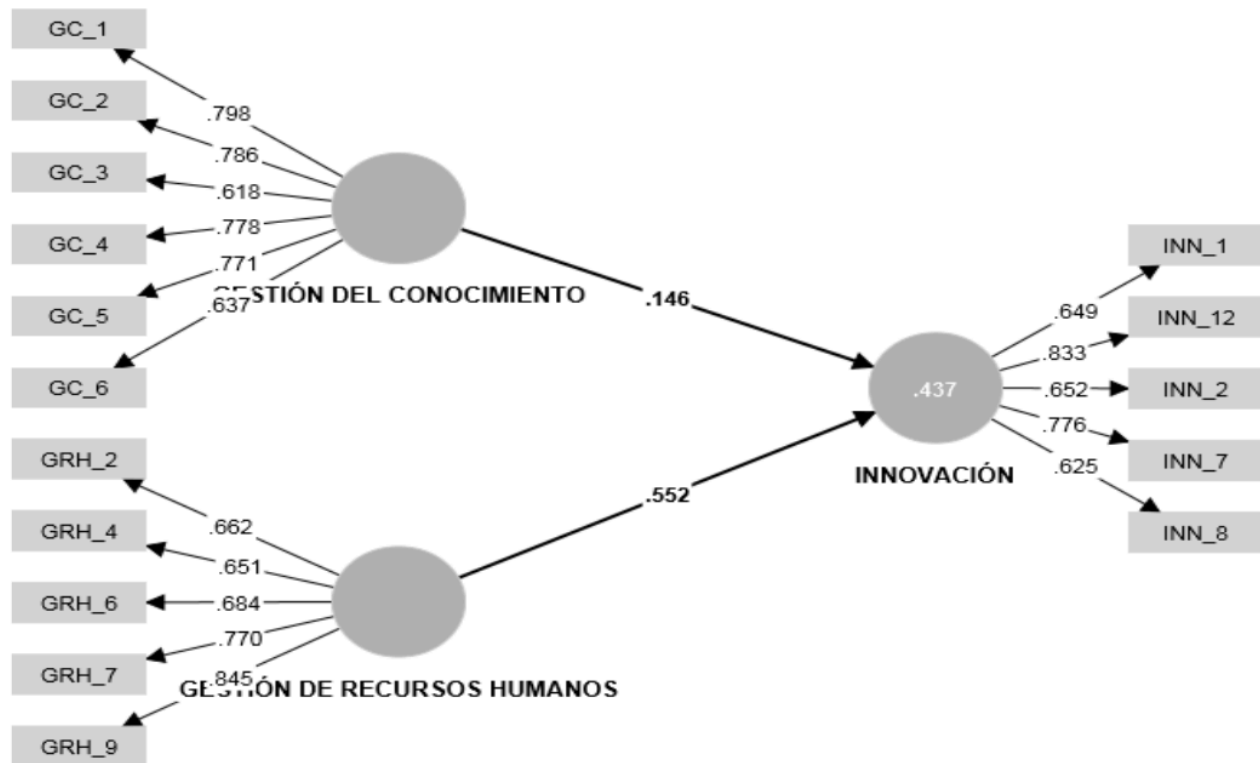


Figure 1
SEM PLS Innovation
Source: Own elaboration.

The first point is the analysis of the reliability of internal consistency in evaluating the measurement model. The value of Cronbach's alpha coefficient, the composite reliability measure, and the Average Variance Extracted (AVE) are studied. The accepted value for both Cronbach's alpha and composite reliability is 0.7 for a modest level of reliability in the early stages of research and 0.9 for basic research (Nunnally, 1978; Fornell & Larcker, 1981). On the other hand, the AVE is a measure that provides the amount of variance a construct obtains from its indicators concerning the amount of variance due to measurement error. The AVE values must be equal to or greater than 0.50, thus ensuring that the construct explains at least half (50%) of the variance of the indicators.

Table 1 shows the results of Cronbach's Alpha, composite reliability, and AVE estimation. As can be seen, the Cronbach's Alpha coefficient and the composite reliability measure are higher than 0.70 in each of the three constructs studied, demonstrating the variables' validity and internal consistency.

The Human Resources Management, Knowledge Management, and Innovation constructs present Cronbach's Alpha of 0.773, 0.830, and 0.756, respectively, all acceptable values for the model. In the case of Composite Reliability, values 0.847, 0.875, and 0.835 were obtained for the constructs Human Resources Management, Knowledge Management, and Innovation, respectively, which are also acceptable in the model.

According to the results in Table 1, the three constructs show an AVE higher than the minimum required of 0.5.

Table 1
Results of internal consistency analysis

Variable	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
GRH	.773	.847	.527
GC	.830	.875	.541
INN	.756	.835	.506

Source: Own elaboration.

The heterotrait–monotrait (HTMT) measure is used to estimate correlations between constructs; the maximum acceptable value of the HTMT measure is 0.85. The results of the HTMT measure for the analyzed model are presented in Table 2. As can be seen, the value of the relationship between the variables is lower than the maximum limit of 0.85; in this sense, it is confirmed that the indicators that make up each variable meet the discriminant validity criteria according to this test.

Table 2
Measurement results HTMT

Variable	GRH	GC	INN
GRH			
GC	.819		
INN	.819	.609	

Source: Own elaboration

Once the measurement model has been evaluated, the structural model must be evaluated, where the predictive capabilities and the relationships between the model constructs are analyzed (Chin, 2010). The first step is to evaluate the collinearity of the model with the Variance Inflation Factor (VIF). According to Hair, Hult, Ringle, and Sarsted (2017), it is considered that there are signs of multicollinearity when the VIF value is more significant than five. The VIF values for the evaluated model are shown in Table 3.

Table 3
Results of the structural model

Path	Path Coefficient	Collinearity (VIF)	Value-t	Value-p
H1: GRH*INN	0.552	1.906	11.691	0.000***
H2: GC*INN	0.146	1.906	2.655	0.008***
Construct	Coefficient R^2			
INN	0.437			

The t and p-values were obtained from the Bootstrapping procedure with 5000 subsamples.
Abbreviations: GRH, human resources management. GC, knowledge management. INN, innovation.
*p<0.1, **p<0.05, ***p<0.01.

According to the results presented in Table 3, the Human Resources Management construct has a VIF of 1.906, and the Knowledge Management variable has a value of 1.906. Thus, Human Resources Management

and Knowledge Management are acceptable predictors of Innovation since having VIF values lower than the limit of 5 confirms that there is no collinearity between the constructs. Therefore, the model is free of multicollinearity problems, so the structural model can be analyzed.

The second step in evaluating the structural model consists of analyzing the path coefficients, which show the relationships of the hypotheses established for the research model. The path coefficients represent the value of the estimated relationship between the exogenous constructs and the dependent variable connected through a unidirectional line. This coefficient explains to what extent each of the independent latent constructs affects the dependent variable.

According to the results shown in Table 3, the independent variable with the most significant impact on Innovation is Human Resources Management since it has a path coefficient closer to 1 than the other variables. The value of the relationship is 0.552. In this sense, it is concluded that Human Resources Management has a positive relationship and a level of explanation of 0.552 on the Innovation variable. The Knowledge Management variable has a Path coefficient that amounts to 0.146. In this sense, it is concluded that Knowledge Management maintains a positive relationship with Innovation and that its degree of incidence on the explanation of the dependent variable is 0.146.

It is necessary to verify whether the coefficients are considered statistically significant at 5% since the values obtained through Bootstrapping show t-values greater than 1.96 (11.691 and 2.655 for Human Resources Management and Knowledge Management, respectively) and the p-value of each variable is less than 0.05 (0.000 and 0.008 for Human Resources Management and Knowledge Management respectively). Based on these values, it is statistically confirmed that there is a direct and positive relationship between the exogenous constructs and the dependent variable.

The third step in evaluating the structural model consists of analyzing the model's predictive capacity through the coefficient of determination R. The proposal of Chin (1998) is followed, which states that the values 0.67, 0.33, or 0.10 in R. indicate that the explanatory capacity of the model is substantial, moderate, or weak, respectively. The value of the coefficient of determination of the designed model amounts to 0.437. In this sense, Knowledge Management and Human Resources Management together can explain 43.7% of innovation, a value indicating that the model has a moderate and acceptable explanatory capacity in social sciences.

In summary, the evaluation of the structural model shows that the model has been designed appropriately, given the values obtained in the different parameters studied. The VIF value of each construct indicates that the model does not present multicollinearity, so the variables that constitute it do not have collinearity between them. The path coefficients present positive values, confirming the direct relationship between the exogenous and endogenous variables.

Likewise, it was discovered that Human Resources Management has the most significant impact on Innovation. The analysis of the statistical parameters t-student and p-value confirms the statistical significance of the Path coefficients with 95% confidence. The coefficient of determination R. shows that the model has a satisfactory explanatory capacity in social studies. According to the estimated value, the variables Human Resources Management and Knowledge Management explain 43.7% of Innovation.

With the data generated by the designed model, it is possible to accept and validate the working hypothesis with 95% confidence. The working hypothesis is accepted by presenting a p-value less than 0.05 and a t-value greater than 1.96: human resource management and knowledge management positively and significantly impact the Innovation of companies in the textile industry in central-western Mexico.

DISCUSIÓN

In this study, the partial least squares technique was used to determine the existing relationship between the research variables. Based on the tests, Knowledge Management and Human Resources Management significantly influence the Innovation generated in the Textile industry.

Practical implications

This article contributes to the study of innovation in textile companies in three ways. First, the specific impact of knowledge and human resources management on innovation was theoretically developed and verified through empirical research. Second, it was found that it is necessary to acquire knowledge, but it is not only about acquiring it; the actual value of knowledge is obtained through its correct management to use it in activities that lead to some innovation. Third, the study reveals that the human part of the company also turned out to be a critical variable for innovation because the human being is the one who possesses the skills and capacities to make innovation possible; he is the source of creativity. In that sense, one can only speak of business innovation with proper human resource management.

Based on the results obtained, it can be observed that the innovation with the most significant load that companies carry out is organizational. Specifically, it generates collaborative relationships with other companies in the industry and research institutions. Subsequently, the companies studied showed that price changes are a type of marketing innovation essential for their operation. In order of importance, according to factor loadings, the third type of innovation that companies in the sector develop is product innovation through the creation of new products and the improvement of existing ones. Finally, and no less critical, is innovation in positioning, that is, in sales channels; the organizations demonstrated that the introduction of new sales channels for their product is something relevant to their activities and, through this indicator, innovations in marketing are developed, just as they are done with prices.

In the case of the independent variable Knowledge Management, loads with significant values were obtained, the highest of which was 0.779, corresponding to the manifest variable GC_2 (item related to the generation of alliances with external participants, grouped in the External indicator of the knowledge creation dimension). Items GC_1 (referring to the internal creation of knowledge), GC_4 (related to the external creation of knowledge through attendance at fairs), GC_5 (associated with the knowledge transfer dimension, through the personal communication indicator) and GC_7 (of the knowledge communication indicator coded in the transfer dimension) have external loads with Knowledge Management that amount to 0.77, 0.763, 0.725 and 0.684 respectively. The indicator with the lowest contribution, but no less significant, is GC_9 (associated with the execution of knowledge of the application dimension), with a value of 0.611 in its external load.

Based on the above, it can be stated that Knowledge Management as a variable that affects Innovation has relevant indicators for three of the four theoretical dimensions considered. Following the results of the estimation, it can be observed that the item that contributes the most to Knowledge Management is the generation of alliances with external participants (GC_2), such as clients, suppliers, and competitors, from which companies obtain information that helps them create new knowledge in the organization. The second relevant indicator is also related to knowledge creation, but at an internal level, that is, through collecting information from the company's employees (GC_1). The acquisition of knowledge at fairs and exhibitions (GC_4) is another source of information for creating knowledge in companies; according to its factor loading, it occupies third place in the list of relevant indicators.

According to its factorial importance, the personal knowledge communication indicator (GC_5), referring to the transmission of knowledge through training courses, workshops, forums, and seminars, is in fourth place; this indicator belongs to the Knowledge Transfer dimension, as does the codified communication item (GC_7), referring to the transmission of knowledge through manuals, intranet or internet. Last, the execution of knowledge (GC_9) implies that the companies studied use the available knowledge to carry out activities that lead them to generate changes and improvements in one of the indicators already mentioned for this variable. As can be seen, the activities of the knowledge creation dimension turned out to be the most relevant

for the independent variable Knowledge Management; companies constantly create knowledge from their sources of information. Knowledge transfer activities, the second dimension, are critical in organizations to develop knowledge internally and externally to reach all firm members.

Knowledge application activities, the fourth theoretical dimension considered, were considered necessary for the exogenous construct since this is the moment knowledge acquires value by being used in some significant activity. The storage dimension, represented by protecting, codifying, updating, and storing the knowledge used, was irrelevant in the Knowledge Management of the companies studied.

The Human Resources Management construct presented positive and significant relationships with its respective indicators. GRH_9 (promotion indicator, associated with the career growth of the human resource organization dimension) had the highest load with a value of 0.845, and the GRH_4 indicator (of the capabilities indicator, associated with teamwork) had the lowest value of 0.651. The manifest variables GRH_2 (occupation indicator), GRH_6 (recruitment policies indicator), and GRH_7 (training indicator) obtained values of 0.662, 0.684, and 0.77 in their external loads, respectively. Based on the above, it can be observed that Human Resources Management is an activity that companies carry out and value as a factor that contributes to improving the innovation activities already mentioned. In this independent construct, exciting results were obtained from the point of view of its factorial loads. Following this indicator as a measure of contribution to Management, it can be concluded that the possibility of job growth, that is, promotion (GRH_9), is a factor that encourages creative and innovative skills in employees. In that sense, it is fundamental as an action within Human Resources Management.

Secondly, it was found that training (GRH_7), referring to the delivery of training courses for developing skills, is another factor contributing to the Management of this variable. Thirdly, the recruitment policies indicator (GRH_6) is associated with the search and selection activities of personnel with creative skills that can contribute to innovation. Each of the activities indicated belongs to the Human Resources Organization dimension; in that sense, these actions are the most developed within the companies studied in the analysis and contribute to the Management activity being carried out.

According to its factor loading, the occupation indicator (GRH_2) is in fourth place. This item shows that jobs associated with administration and engineering are relevant for innovation. In this sense, the occupational structure is a significant dimension of the company's Human Resources Management process.

Regarding teamwork and problem-solving, the capabilities indicator (GRH_4) occupies fifth place in factor loading. This activity is also present in the organizations studied and shows that the competencies dimension is relevant for managing the variable. According to the above, the activities focused on the organization of human resources are those with the most significant weight for human resource management, followed by the jobs included in the organizational structure dimension and by the capacity of employees to work in a team, which refers to the competencies of the staff. Each of these Human Resource Management activities positively impacts the Innovation of the companies studied in any of its three relevant dimensions (Product, Marketing, and Organizational). In the case of the workforce qualification dimension, associated with the level of education of employees, its irrelevance to the model was shown.

Theoretical Implications

Some results of this research coincide with those obtained by de Moraes e Soares (2024), who mention that “textile companies urgently need to invest in R&D to increase the industry's efficiency. The study points to the need to define strategies to improve the efficiency of economic activities and promote a plan based on competitiveness, adaptability, and greater efficiency in Portugal's textile and clothing industry (de Moraes e Soares et al., 2024).

Likewise, this research coincides with the work carried out by José Moleiro Martins (2024), both in the objective and in some results of the research: “This study aims to comprehensively investigate the role of knowledge management and innovation as crucial drivers of competitiveness in textile companies,” the study

seeks to explore the academic landscape, identify trends and unravel patterns related to knowledge management and innovation in the textile industry.

The study identifies critical themes, explores collaborative networks, and assesses gaps in existing knowledge. The study reveals a multidimensional exploration of the textile industry, emphasizing innovation, knowledge management, competition, and sustainable development. The analysis highlights the fundamental interaction between knowledge management and innovation in shaping competitiveness, and academic interest in this topic is increasing. China appears to be one of the main contributors to global engagement (Martins, 2024).

This study examines the relationship between human resource management, innovation, and firm performance. It recognizes the direct effect of human resource management on innovation and its indirect impact on firm performance, showing that human resource management plays a vital role for enterprises. This result also implies that to promote innovation and improve firm performance, enterprises can build and operate human resource management as a preferred solution in the market context, which is increasingly under competitive pressure today.

The combination of innovation in all its forms and random variables, such as human resource management, knowledge management, and mainly sustainability and care for the environment, appear as future challenges for the textile industry. The challenge is complex since the fashion industry has short product life cycles, various products, unpredictable and volatile demand, and long and inflexible supply chains (Brydges, 2021).

CONCLUSIONS

According to the results already discussed, innovation is not something foreign to the companies in the sector studied; instead, it is an activity that they carry out constantly, even without even knowing that they are doing so. The innovation task is perceived in three dimensions: Product, Marketing, and Organization. The Process dimension did not turn out to be a relevant activity in the region analyzed. This study provides evidence that HRM practices influence innovation and creativity in firms, thereby indirectly contributing to improved firm performance.

The results of this study also show that workers play a crucial role in the production, diffusion, and absorption of knowledge. Therefore, to improve the overall efficiency of textile companies and create innovations, the training of human resources in organizations should be the first aspect to be considered.

Our study provides evidence that human resource management influences innovation and creativity within enterprises, indirectly contributing to improved firm performance. Innovation is not a phenomenon that occurs in isolation, being fostered by a single factor, but rather an activity that develops from different variables that, individually and as a whole, contribute to improving the levels of innovation in companies. The constructs of human resource management and knowledge management then turned out to be two variables that effectively positively impact innovation. This impact was statistically proven through the analysis of the Path coefficients, through which the general hypothesis of the work was accepted as valid. The two factors can explain 43.7% of innovation in companies in the sector studied.

Furthermore, human resource management contributes to innovation performance by fostering an organizational culture that values creativity, collaboration, and continuous learning, cultivating a workforce that generates and implements innovative ideas.

The results allowed for analyzing innovative and non-innovative textile companies. By classifying the companies studied as innovative and non-innovative, it is possible to make a more in-depth analysis of those that do introduce innovations and, in this way, to know more precisely what type of innovations are carried out in the organizations of the study area. Regarding the companies labeled as non-innovative, it can be deduced that, in addition to not being a significant percentage of the total studied, they are organizations that have yet to overcome one or more of the barriers indicated in the theoretical section.

The existence of companies that do not innovate is not desirable. However, their minimal representation in the sample shows that the innovation variable is a factor of interest for most companies in the territory today since almost 97 out of 100 companies are striving to make changes to improve their results, all through innovation. These findings open up new possibilities for future research, which is an essential contribution of this research.

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