

Knowledge management in the public sector: a model with structural equations**Gestión del conocimiento en el sector público: un modelo con ecuaciones estructurales**

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Abstract

This study aims to answer the research question: what is the relationship between Knowledge Management (KM), Organizational Learning (OL), and Intellectual Capital (IC) in the public sector? Its purpose is to propose a theoretically supported innovative model and to confirm its validity in the context studied through an empirical test with multivariate statistics. The research type is quantitative, non-experimental, descriptive, explanatory, correlational, and cross-sectional. The simple random sample consisted of 296 employees of the public social assistance sector in the state of Jalisco, Mexico. Through the use of Structural Equation Modeling (SEM), the model and the hypotheses were tested. The findings show a significant relationship between the model variables: OL and KM; CI and KM; CI and OL, too. This research built an innovative theoretical model for the sector studied, with standardized adjustment indexes within statistical parameters and valid and reliable indicators, highlighting the importance of knowledge as an added value in public institutions, and its play an important role in improving and innovating public sector performance to respond to the citizens' demands for their wellbeing.

Knowledge, Intellectual capital, Organizational learning**Resumen**

Este estudio pretende responder a la pregunta de investigación: ¿cuál es la relación entre la Gestión del Conocimiento (GC), el Aprendizaje Organizativo (AA) y el Capital Intelectual (CI) en el sector público? Su propósito es proponer un modelo innovador sustentado teóricamente y confirmar su validez en el contexto estudiado mediante una prueba empírica con estadística multivariante. El tipo de investigación es cuantitativo, no experimental, descriptivo, explicativo, correlacional y transversal. La muestra aleatoria simple estuvo conformada por 296 empleados del sector público de asistencia social del estado de Jalisco, México. Mediante el uso del Modelo de Ecuaciones Estructurales (SEM), se probaron el modelo y las hipótesis. Los resultados muestran una relación significativa entre las variables del modelo: OL y KM; CI y KM; CI y OL, también. Esta investigación construyó un modelo teórico innovador para el sector estudiado, con índices de ajuste estandarizados dentro de parámetros estadísticos e indicadores válidos y confiables, resaltando la importancia del conocimiento como valor agregado en las instituciones públicas, y su importante papel en la mejora e innovación del desempeño del sector público para responder a las demandas de los ciudadanos para su bienestar.

Conocimiento, Capital intelectual, Aprendizaje organizacional**Citation:** HUERTA-CHÁVEZ, Irma Alicia & FIGUEROA-OCHOA, Edgar Benjamín. Knowledge management in the public sector: a model with structural equations. Journal-Public Economy. 2023. 7-12:28-45.

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Introduction

Since public institutions are places where a lot of knowledge is generated and consumed. Likewise exist its responsibility and commitment to respond to citizens' demands and the institutional objectives proposed since the creation of these instances. It implies identifying as raw material the intangible assets by public servants, such as knowledge, learning, and intellectual capital. This research explains through a multivariate analysis the existing relationships between Knowledge Management (KM), Organizational Learning (OL), and Intellectual Capital (IC) in this sector.

Furthermore, the public sector faces challenges greats in the knowledge economy, stemming from the knowledge is a determining factor in its competitiveness. Moreover, this sector must be subject to the citizens' new demands, which implies adequate management of intangible assets representing a competitive advantage. Added to this is the frequent retirement of employees and the abundant transfer of knowledge workers among the various government departments (Sánchez et al. 2010; Sarmiento and Roman 2011).

Also, this leads to the loss of the most valuable resource of institutions, such as knowledge, which impacts organizational learning and intellectual capital. Therefore, knowledge management implies articulated actions that consider the various stakeholders according to citizens' requirements for the public institutions' improvement with knowledge generation and retention (Huerta-Chávez 2021). In addition, there is a lack of teamwork to support knowledge exchange, inadequate documentation to preserve organizational memory, and little or no training for successful management implementation (Aladwan et al. 2022).

Now, after reviewing the state of the art, in addition to the problems described, regarding the responsibility and challenges faced by the sector. It is possible to state that the public sector lacks sufficient studies to explain the impact of knowledge management, organizational learning, and intellectual capital together.

Consequently, it generates knowledge gaps due to the prevalence of isolated studies which, in their methodologies, focus on management informants, necessitating the inclusion of middle and operational managers who have direct contact with citizens in the provision of public services.

Synthesizing, the new public management, the knowledge economy, and the public sector's duty consist in providing its services and solving citizens' demands. It implies worrying about how knowledge, organizational learning, and intellectual capital generating. Also, it involves identifying what happens within the organization to generate a theoretical, practical, and methodological contribution, whose applicability in the sector leads to findings to describe and explain the behavior and interactions of the constructs under study.

Based on the above, to contribute to knowledge and innovation theory, the problem is formulated from the following question:

What is the relationship between Knowledge Management (KM), Organizational Learning (OL), and Intellectual Capital (IC) in Jalisco public sector?

For this, it is possible to establish the main aim: Evaluate the relationship between Knowledge Management (KM), Organizational Learning (OL), and Intellectual Capital (IC) in the public sector in Jalisco. In order to influence the problem, the central hypothesis is established as follows:

H₀: There is no significant relationship between Knowledge Management (KM), Organizational Learning (OL), and Intellectual Capital (IC) in the public sector in Jalisco.

H_a: There is a significant relationship between Knowledge Management (KM), Organizational Learning (OL), and Intellectual Capital (IC) in the public sector in Jalisco.

This article is composed of ten sections, which are described below, in order to clarify the content of each one of them. In the first section, there is an introduction to the research topic, the problem to be solved, the hypothesis, the added value of the technique used and the generalities of the research.

In the second section, the literature review is presented, including an overview of the theory supporting the research and hypothesis. In this same sense, the third section details materials and methods, including study design, sample, research instrument and data analysis. The fourth section includes the results. In the fifth section includes the discussion, with SEM, as well as the discussion in the light of the supporting theory. The sixth section includes the annexes, where the instrument used is included.

The seventh section includes the acknowledgements to the participating. The eighth section shows the source of financing for the research work. The ninth section presents the conclusions and recommendations, where the main findings, contributions and future research directions are presented. Finally, the ten section lists the references of the authors who contribute directly to this study.

Theoretical framework and hypothesis

Organizational learning and knowledge management

Easterby-Smith and Lyles (2003), have theorized the relationship between OL and KM. In this regard, they considered that KM focuses on knowledge content, while OL emphasizes the knowledge process that a company obtains, produces, manages, and finally uses. Meanwhile, Ho (2008) conducted an empirical study in Taiwan and collected survey data to test the relationships among the four dimensions expressed in the proposed structural equation model. The results showed that self-directed learning directly and significantly impacts OL and KM capability. Furthermore, self-directed learning influenced organizational performance indirectly through OL and KM capabilities.

In this regard Liao and Wu (2009) also conducted an empirical study based on a sample of knowledge-intensive Taiwanese firms using structural equations. They proved that OL is a coordination mechanism. Empirical evidence supports the perspective that KM affects organizational performance through OL. However, Chawla and Joshi (2011) used a convenience sample of 51 senior and mid-level executives from 16 public and private sector organizations in India.

They found that private sector organizations fared better in all dimensions of OL comparing public sector organizations. Although the scores were merely satisfactory and there was room for improvement.

On the other hand, Noruzy et al. (2013) used a sample of 280 senior managers, executives, administrative and more levels from companies in Iran and the structural equation modeling. They found that transformational leadership directly influenced OL and KM; OL directly influenced KM. Meanwhile, Castañeda (2015) points out a difference between KM and OL. He mentions that KM is managing the knowledge that already exists. However, OL focuses on the new knowledge creation for the institution, including individual, group, and organizational levels.

Now, Imran et al. (2017), on their part, in an empirical study involving 228 managerial level employees of public and private banks in Pakistan. Their results show a substantial positive influence of KM capabilities in improving organizational performance, and OL partially mediates the relationship between KM capabilities and organizational performance. Also, Abdi et al. (2018), with data collection through a survey of 279 companies supplying auto parts to Iran Khodro Company, used PLS-SEM for data analysis. The researchers found that organizational culture and KM influenced organizational innovation. In addition, OL played a mediator in that relationship. Too there is a positive relationship between KM and OL.

In another sense, Castañeda et al. (2018) studied through a systematic literature review concerning the publications on KM and OL from the 1970s to 2016. The authors conclude that the core processes of OL, the creation, and acquisition of knowledge, have been conceptually absorbed by the literature on KM in recent years. Due to the above, the close relationship between these two variables, with tendencies to form part of each other. In this regard, Huerta-Chávez (2019), through a pilot test, validated a scale with the measurement of KM, OL, and IC variables, proposing a model in which there is theoretically a relationship between the variables studied. Subsequently, Huerta-Chávez et al. (2020) identified with Exploratory Factor Analysis nine factors for these variables.

Due to what already has been described is concluded that the literature has recognized the importance of KM and OL, as well as the relationship between these two constructs, which allows the first hypothesis to arise:

H₁: Organizational Learning (OL) has a significant relationship with Knowledge Management (KM) in the public sector.

Intellectual capital and knowledge management

Another relationship theoretically demonstrated and tested with some empirical studies is between IC and KM. For their part, León et al. (2006) state that KM is related to IC as a tool to increase these intangible assets in the organization. On the other hand, Sánchez et al. (2010), through an empirical study in the public sector in Mexico with 180 public servants from government institutions, conclude that KM is related to IC and knowledge comes from the internal environment.

Also, Núñez (2014) points out the existence of studies that show the association of KM and IC, which he verified by finding values that ensure the correlation between these variables with the participation of 50 companies in the tequila industry in Jalisco, Mexico, with quantitative and correlational research of non-experimental design. Likewise, Archibold and Escobar (2015), in an empirical study in the public sector, concluded that the existence of strategic capabilities of KM as identifying, transmitting, and producing knowledge as an intangible asset that generates value and competitive advantages with human, structural and relational capital, so the relationship between the variables comes to light.

Similarly, Vizcaíno et al. (2018), with a descriptive, exploratory, cross-sectional, and correlational study through the hypothetic-deductive method, to a non-representative sample composed of 33 academics of the University of Guadalajara, through an applied survey comprised of 41 items, whose Cronbach's alpha was .881 and the data were worked with SPSS. The researchers concluded that competitiveness is considered comprehensively from KM and IC components. The results showed that KM and IC are related and determine competitiveness.

For their part, Huerta-Chávez and Castro-Valencia (2019) concluded that KM and IC are inseparable binomials of utmost importance for public sector improvement. Good management depends on the generation of IC with a beneficial impact on citizens, better practices for modernization, and organizational objectives fulfillment. Likewise, Huerta-Chávez (2019) proposes a theoretical model showing the relationship between KM and IC in addition to OL for the public sector.

In concomitance with the relationships of the variables, it is possible to refer to Mendoza-Orellana (2019), who evaluated IC as a critical success factor for the improvement of performance in KM processes in Public Universities in Zone 4 of Ecuador with 345 participants with a descriptive correlational non-experimental type of research. He concluded human resources represent the most important intangible asset for organizations to develop and grow. Therefore, it requires investment in IC through preparation and training to sustain its identity as an institution.

According to Huerta-Chávez et al. (2020), in an empirical study with the participation of 305 employees of the public social assistance sector, identified nine factors to explain the variables of KM, OL, and IC by using the EFA methodology. Also Ibarra-Cisneros et al. (2020) point out that KM theorists connect it with IC, allowing them to have empirical studies to demonstrate the correlation between the variables.

As a result of the theoretical review, it is possible to affirm the existence of an inseparable relationship between KM and IC because they are significant elements in the organization. They are very characteristic of organizations, so they are intangible resources that are complicated to manage. In addition, they create value based on the resources and capabilities theory and the knowledge-based theory. Due to the above, the second hypothesis formulated is:

H₂: Intellectual Capital (IC) shows a significant relationship with Knowledge Management (KM) in the public sector.

Intellectual capital and organizational learning

Several researchers supported the relationship between IC and OL. In this regard, Bontis (1998) stated that IC and OL come together when IC is considered the unit of the inventory of organizational learning flows. However, IC may not necessarily obtain through education or training. In this same sense, Koenig (1998) affirmed that IC has grown within KM, and this has incorporated OL, so the relationship between the variables is present.

Conforming to Bueno (1999), he spoke not only of KM but also pointed out the scope of OL and IC. KM is dynamic since it manages the set of knowledge flows (external and internal, captured or created, explicit or tacit). While learning is a process that transforms and incorporates individual, group, and organizational knowledge such a whole. Finally, IC is the value created in the organization.

Now Lennon and Wollin (2001) stated that when organizations develop and disseminate their OL, they will create a form of IC that is difficult for other competitors to imitate, denoting their relationship. In the same vein, Chen et al. (2004) stated that OL is implicit in the three types of IC: human, structural, and customer or relational. Likewise, León et al. (2006) detected a relationship that implies adequate KM, which should be supported by OL, thus contributing to the improvement and development of IC in organizations.

In this same sense, in compliance with Caraballo et al. (2009), the management of IC and the OL acquisition as organizational processes, being interrelated, require KM so that learning to increase and improve continuously. In agreement with Archibold and Escobar (2015), through a quantitative study with public officials' participation of the territorial comptrollers of the Department of Atlántico. They evaluated KM with three dimensions, OL, technologies for KM, and IC. In this way, the relationship between the factors is predominant as part of the construct of KM.

Similarly, Chahal and Bakshi (2015) found in their research the impact of IC on competitive advantage as well as the role of innovation as a mediating variable and OL as a moderating variable in the relationship between IC and competitive advantage with the participation of 144 branches of 21 public and seven private banks operating in North India (Jammu), three executives (including one manager and the two-senior staff) from each branch. On the other hand, conforming to Angulo (2017), KM and OL undoubtedly promote IC at all levels of the organization with the management of both human, structural, and relational capital for the improvement of organizations as a strategic factor for the development of truly useful knowledge.

In the same vein, Abualoush et al. (2018), with their quantitative study in Jordan and using structural equation modeling, found that KM infrastructure has a positive effect on the process of KM. In addition, the KM process, IC, and organizational performance are related. As reported by Huerta-Chávez (2019) a study validated a scale with OL, and IC, proposing a model in which, there is theoretically a relationship between the related variables. Subsequently, Huerta-Chávez et al. (2020), in an empirical study managed to identify nine factors for the explanation of the variables.

In summary, according to the literature reviewed, both IC and OL are focused on knowledge, are intangible resources, and join when IC is the unit of the inventory of organizational learning flows. Therefore, it is possible to state that the hypothesis to test is:

H₃: Intellectual Capital (IC) has a significant relationship with Organizational Learning (OL) in the public sector.

Materials and methods*Study design, sample, research instrument and data analysis*

The present research is non-experimental, descriptive, explanatory, and correlational, under a quantitative approach. The existing relationships between the KM, OL, and IC constructs were evaluated based on the measurements obtained from the perceptions of 296 employees of the public sector of Jalisco (see Table 1) through simple random sampling.

The research subjects were operating personnel, middle and senior management working in the public sector in charge of social assistance at the state level in Jalisco, and the simple random sampling was used with a confidence level of 95% and with a margin of error of $\pm 5\%$ (Bernal, 2016; Hernández et al., 2014).

Categorical variables	Sample profile
Age	Average = 42 years
Gender	Male = 25%
	Female = 75%
Educational level	Basic education = 24%
	Bachelor's degree = 65%
	Postgraduate degree = 11%
Position	Operating personnel = 72%
	Middle and senior management = 28%

Table 1 Characteristics of the sample

Source: Own elaboration (2023) based on the results obtained in SPSS version 25.

The measuring instrument integrated three constructs with nine dimensions, adapted from Castañeda and Fernández (2007); Chahal and Bakshi (2015); Huerta-Chávez (2019); Huerta-Chávez et al. (2020); Rodríguez-Ponce (2007) after applying exploratory by Huerta-Chávez et al. (2020) and confirmatory factor analysis, the validated instrument was with 40 items using Structural Equation Modeling (SEM).

For hypothesis testing with estimates of causal relationships, we used SEM. It can incorporate measurement error in the estimation process and the simultaneous estimation, as well as several interrelated dependence relationships of latent and multidimensional variables (Hair et al., 1999). We also used the statistical software Statistical Package for the Social Sciences (SPSS) with Analysis of Moment Structures (AMOS) version 25.

Results

Confirmatory factor analysis (CFA)

The data for the factor analysis development at the confirmatory level was analyzed using SEM to understand the relationships between the dimensions. This multivariate analysis technique deals with multiple relationships simultaneously and evaluates the proposed relationships between the variables.

SEM allows the transition from an exploratory to a confirmatory factor analysis by estimating the parameters of these relationships and confirming them (Hair et al., 1999).

The analyses were with the maximum likelihood method that simultaneously and interactively estimates all the coefficients until the differences between the estimated and observed covariances are minimal in the AMOS statistical software version 25, with a sample of 296 questionnaires after applying exploratory factor analysis (Huerta-Chávez et al., 2020; Huerta-Chávez and Figueroa-Ochoa, 2023).

Path analysis

With the path analysis, was 16 items eliminated from the 56 originals for presenting R^2 lower than 0.60 and relationships lower than 0.70 concerning the information contribution to dimension explanation. With the 40 items that prevailed, the confirmatory factor analysis was for each construct, which ran adequately in the AMOS statistical software in version 25, for which the recommendations provided by AMOS for the model improvement considered, achieving acceptable values in the adjustment model in each of the three variables: KM, OL, and IC.

KM validated with the ten original items that presented factor loadings greater than .80 between each item and its dimension. In addition, the covariances between the dimensions were over than 0.90. Also, OL validated with nine from ten originals items whose factor loadings were over than 0.70 between each item and its dimensions, the covariances between the dimensions were over than 0.80. Finally, IC validated with 21 of 36 originals items, both the factor loadings of the items and the covariances in the dimensions presented values greater than 0.80.

The goodness-of-fit indices were within the established parameters (Hair et al., 1999). To KM, the values obtained were by absolute fit with RMSEA = 0.071, for incremental fit with TLI = 0.984, NFI = 0.986, and CFI = 0.991, to parsimony fit CMIN/DF = 2.475. While for LO, the goodness-of-fit indices were by absolute fit with RMSEA = 0.065, for incremental fit with TLI = 0.979, NFI = 0.981, and CFI = 0.989, to parsimony fit CMIN/DF = 2.238.

Finally, for IC, the goodness-of-fit indices were by absolute fit with RMSEA = 0.075, for incremental fit with TLI = 0.953, NFI = 0.948, and CFI = 0.967, to parsimony fit CMIN/DF = 2.672 (see Table 2).

Variables	Absolute adjustment	Incremental adjustment			Parsimony adjustment
	RMSEA < .08	TLI ≥ .90	NFI ≥ .90	CFI ≥ .90	CMIN/DF < 3
KM	0.071	0.984	0.986	0.991	2.475
LO	0.065	0.979	0.981	0.989	2.238
IC	0.075	0.953	0.948	0.967	2.672

Table 2 Goodness-of-fit indices for each variable
Source: Own elaboration (2023) based on the results obtained in SPSS AMOS version 25

Structural and measurement model

The validated instrument consisted of 40 items of the 56 initially proposed. This model adjusted in all its dimensions with positive factor loadings above 0.70 (see Figure 1), presenting standardized adjustment indexes CMIN/DF of 2.652, RMSEA of 0.075, TLI of 0.981, NFI of 0.982, and CFI of 0.989, as well as the estimated standardized data of the model (see Table 3).

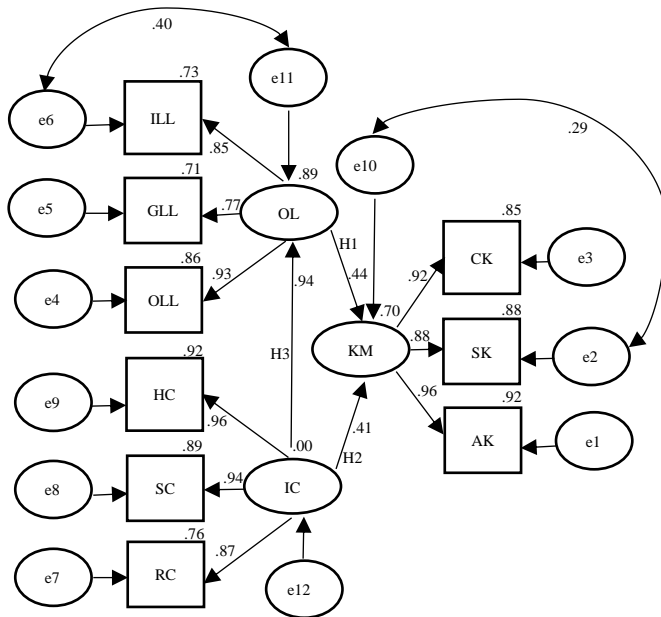


Figure 1 Structural and measurement model. This structural and measurement model shows the linked to organizational learning and intellectual capital with knowledge management

Source: Own elaboration (2023) based on the results obtained in SPSS AMOS version 25

Variables	Absolute adjustment	Incremental adjustment			Parsimony adjustment
	RMSEA < 0.08	TLI ≥ 0.90	NFI ≥ 0.90	CFI ≥ 0.90	CMIN/DF < 3
KM-OL-IC	0.075	0.981	0.982	0.989	2.652

Table 3 Goodness-of-fit indices of the structural equation model

Source: Own elaboration (2023) based on the results obtained in SPSS AMOS version 25

Reliability of the structural model: AVE and CR

Composite Reliability (CR) is a more robust measure than Cronbach's Alpha, whose value should be greater than 0.70. While Average Variance Extracted (AVE) explains the amount of variability that can be explained by the model, whose value should be greater than 0.50 (Hair et al., 1999). To determine convergent validity, the AVE and CR are calculated using the following formulas (see equations 1 and 2):

Equation 1 AVE calculation

$$(\sum \lambda^2)/n \tag{1}$$

Equation 2 CR calculation

$$(\sum \lambda)^2 / ((\sum \lambda)^2 + (\sum \epsilon)) \tag{2}$$

The value of "λ" was obtained from the estimated values in the standardized regression weights calculated in the AMOS version 25 program; while the value of "n" is equal to the number of items contemplated in the measurement and structural models, and the value of "ε" was obtained from the difference of 1 minus λ², which in the end is added depending on the number of "n". The values obtained for each dimension of the three variables under study are shown below, where results were obtained that meet the criteria sought (see tables 4, 5, 6).

Dimension	AVE criterion > 0.50	CR criterion > 0.70
Create Knowledge (CK)	0.763	0.941
Share Knowledge (SK)	0.920	0.971
Apply Knowledge (AK)	0.864	0.927

Table 4 AVE and CR by dimension of the Knowledge Management (KM) variable

Source: Own elaboration (2023)

In this table, the dimensions of KM variable meet the criteria sought to determine the convergent validity of AVE and CR.

Dimension	AVE criterion > 0.50	CR criterion > 0.70
Individual Level Learning (ILL)	0.632	0.836
Group Level Learning (GLL)	0.763	0.906
Organizational Level Learning (OLL)	0.693	0.871

Table 5 AVE and CR by dimension of the Organizational Learning (OL) variable

Source: Own elaboration (2023)

In this table, the dimensions of OL variable meet the criteria sought to determine the convergent validity AVE and CR.

Dimension	AVE criterion > 0.50	CR criterion > 0.70
Human Capital (HC)	0.701	0.933
Structural Capital (SC)	0.765	0.970
Relational Capital (RC)	0.720	0.927

Table 6 AVE and CR by dimension of the Intellectual Capital (IC) variable

Source: Own elaboration (2023)

In this table, the dimensions of IC variable meet the criteria sought to determine the convergent validity AVE and CR.

Hypothesis testing

After the path analysis and confirmatory factor analysis in AMOS with acceptable standardized values is integrated the single measurement and structural model, including the hypotheses of cause and effect between each of the variables (see Figure 1), in addition to calculating the standardized values and compliance with criteria (see Table 7).

With a structural model, the R^2 values are higher than 0.60, which denotes that each dimension has adequate coverage. Likewise, the relationship of each dimension with its construct is correct higher than 0.70, presenting standardized adjustment indexes CMIN/DF of 2.652, RMSEA of 0.075, TLI of 0.981, NFI of 0.982, and CFI of 0.989 (see Table 3).

Now, the structural equation model with its hypotheses stated and the p-values generated by AMOS version 25 (all less than 0.05). It's possible to conclude that all hypotheses are accepted. The KM, OL, and IC regression weights are below (see Table 7).

	Estimate	S.E.	C.R.	P
IC → OL	1.012	0.048	21.147	***
OL → KM	0.526	0.175	3.009	0.003
IC → KM	0.514	0.187	2.756	0.006

Table 7 Hypothesis tests and standardized estimated values for the structural equation model

Source: Own elaboration (2023) based on the results obtained in SPSS AMOS version 25. This table shows that there is a significant relationship between the variables studied, where the "p" value is less than 0.05.

The confirmatory factor analysis showed a good structural relationship between the variables and also made it possible to hypotheses proposed test. Relating to the hypothesis test and the standardized estimated values for the structural equation model of this research, it is possible to conclude that OL has a positive influence on KM with a standardized coefficient of 0.526 (OL→KM), thus proving the first hypothesis H₁: Organizational Learning (OL) has a significant relationship with Knowledge Management (KM) in the public sector.

In the same sense, with the structural model and the standardized values, it is possible to affirm that IC positively influences KM with a standardized coefficient of 0.514 (IC→KM), so the second hypothesis H₂: Intellectual Capital (IC) shows a significant relationship with Knowledge Management (KM) in the public sector is proven.

Finally, according to the hypothesis test and the standardized estimated values, this research demonstrated that IC positively influences OL with a standardized coefficient of 1.012 (IC→OL). Therefore, the third hypothesis H₃: Intellectual Capital (IC) has a significant relationship with Organizational Learning (OL) in the public sector was tested.

Discussion

The development of KM is a process within the organization that allows managing the most valuable resource, knowledge, through OL flows and IC. In addition, KM generates individual knowledge and for the institution. This knowledge comes from interactions between individuals and organizations and contemplates individuals' experiences. When the knowledge is transmitted, it is shared and the moment when tacit knowledge becomes explicit knowledge to be applied.

To KM variable and its CK, SK, and AK dimensions can be compared with results obtained by Araneda-Guirriman et al. (2017); Huerta-Chávez (2019); Huerta-Chávez and Castro-Valencia (2019); Huerta-Chávez et al. (2020); Pedraja-Rejas and Rodríguez-Ponce (2008); Pedraja-Rejas et al. (2009); Rodríguez-Ponce (2016); Rodríguez-Ponce et al. (2010); who demonstrated that the scale is indeed measuring KM with the three dimensions mentioned.

They presented acceptable levels of reliability, with Cronbach's alpha values above 0.70 (Nunnally, 1978; Hair et al., 1999), as in this study. Likewise, the KMO index in both the Huerta-Chávez (2019) study and the present investigation was higher than 0.50 as an acceptable value (Hair et al., 1999) they were higher than 0.80.

The fundamental three-dimensional process measuring for managing knowledge in organizations made it possible to determine the relationship between OL and CI with KM. In this regard, KM has a principal role in organizations that consists of articulating and amplifying the new knowledge developed by individuals (Nonaka, 1994; Nonaka and Takeuchi, 1995). At the same time, it allows for generating, absorbing, transmitting, and using knowledge in a knowledge society, resulting in a technological information society only carrying what can be valuable for the organization (Zambrano-Vargas and Suárez-Pineda, 2017).

Consequently, the principal indicators contributing to KM explanation in the public social welfare sector focus on the existence of an information exploration system. Also, the processing and integration of the information obtained added to the need for the system information finding presence as part of the creation and interaction for the new knowledge generation in organizations. However, other indicators of great relevance for KM are found precisely in the exchange of knowledge among managers and the mutual sharing of this knowledge.

In the same vein, the application of knowledge by managers when contemplating it in decision-making is essential for KM to fulfill its fundamental role within organizations by creating, sharing, and applying knowledge for the generation of value for stakeholders (Araneda-Guirriman et al., 2017; Huerta-Chávez, 2019; Huerta-Chávez and Castro-Valencia, 2019; Huerta-Chávez et al., 2020; Pedraja-Rejas and Rodríguez-Ponce, 2008; Pedraja-Rejas et al., 2009; Rodríguez-Ponce, 2007; Rodríguez-Ponce, 2016; Rodríguez-Ponce et al., 2010).

Regarding the confirmatory factor analysis for this construct, goodness-of-fit indices were found within the parameters established in statistical theory (Hair et al., 1999), for absolute fit with RMSEA = 0.071, for incremental fit with TLI = 0.984, NFI = 0.986, and CFI = 0.991, and for parsimony fit CMIN/DF = 2.475 (see Table 2). These values confirmed the KM theory with CK, SK, and AK factors because its measure is correct to explain this variable in the study context.

For its part, the OL variable, understood as the process of individual and shared thinking and actions in an organizational context (Rashman et al., 2009), is provided at three levels: individual, group, and organizational, for which OL is an instrument to create competitive advantages that affect performance (Riquelme et al., 2008). OL measured with its ILL, GLL, and OLL dimensions, can be compared with results obtained by Castañeda (2015); Huerta-Chávez (2019); Huerta-Chávez et al. (2020); López et al. (2012); Quispe and Vigo (2017); and Suárez et al. (2019), in which acceptable levels of reliability were demonstrated, with Cronbach's alpha values above 0.70 (Nunnally, 1978; Hair et al., 1999), as in the present study.

However, of the six studies, only for the ILL dimension, in the Castañeda (2015) and Suárez et al. (2019) studies, values lower than those proposed by statistical theory were obtained. Regarding the KMO index for this variable, the values obtained in various studies by Castañeda (2015); Huerta-Chávez (2019); Huerta-Chávez et al. (2020); López et al. (2012); and Quispe and Vigo (2017); were higher than 0.50 which demonstrated an acceptable value according to Hair et al. (1999), in agreement with the values obtained in the present work.

In addition, it is relevant to emphasize the OL three dimensions allowed for determining the relationship between KM, IC, and itself. In this research, the principal indicators of the OL explanation corroborated are the form of individual learning by observation or instruction and the opportunity to develop skills as part of the learning.

At the same time, the learning indicators at GLL imply learning with enthusiasm, the exchange of knowledge, and the achievement of collective learning in group work. Finally, learning at the OLL involves three principal indicators, the use of knowledge that occurs in organizations, adaptation to change, and the design of new products or services (Castañeda, 2015; Castañeda and Fernández, 2007; Huerta-Chávez, 2019; Huerta-Chávez et al., 2020; López et al., 2012; Quispe and Vigo, 2017; Suárez et al., 2019).

Likewise, in the confirmatory factor analysis for this construct, goodness-of-fit indices were found within the parameters established in statistical theory (Hair et al., 1999), for absolute fit with RMSEA = 0.065, for incremental fit with TLI = 0.979, NFI = 0.981, and CFI = 0.989, for parsimony fit CMIN/DF = 2.238 (see Table 2).

The IC variable is the accumulated intangible assets generated by the KM within the organization, although not counted in the organization's accounting statements, create present or future value for the fulfillment of different social objectives in a strategic manner; it is also a form of knowledge, intellect and intellectual capacity activity is used to create value (Shin et al., 2010; Edvinsson and Sullivan, 1996).

Conceptualizing IC as part of the organization's intangible assets based on knowledge integrated of human capital, structural capital, and relational capital increases organizational performance and creates value. IC measured with HC, SC, and RC dimensions, can be compared with results obtained by Chahal and Bakshi (2016); Huerta-Chávez (2019); Huerta-Chávez and Castro-Valencia (2019); and Huerta-Chávez et al. (2020), who demonstrated that the scale is reliable, given that they presented Cronbach's alpha values above 0.70 (Nunnally, 1978; Hair et al., 1999) as in the present study. Similarly, the KMO index in the Huerta-Chávez (2019) study and in this research was higher than 0.50 as an acceptable value (Hair et al., 1999).

Principal indicators for the IC explanation in the public social assistance sector corroborated in the present research focus on employees' continuous training, education, and skills. Too, motivation to share new ideas without forgetting employee happiness and satisfaction. The formation of HC is imminent because the employee is contemplated as a fundamental factor for the organization by training, instructing, and motivating him.

Now, for the SC development, principal indicators to focus on are, in the first instance, the creation of a pleasant environment, communication among personnel, knowledge duly supported, the development of new products and services, as well as support for innovative ideas, improvement of service quality, structures, and systems, accessibility to information, processes and organizational culture. About RC, the indicators focus on updating customer data, knowledge, opinion, interaction, and shared customer feedback (Chahal and Bakshi, 2015; Chahal and Bakshi, 2016; Huerta-Chávez, 2019; Huerta-Chávez and Castro-Valencia, 2019; Huerta-Chávez et al., 2020).

With the confirmatory factor analysis for this construct, goodness-of-fit indices were found within the parameters established in statistical theory (Hair et al., 1999) and results similar to those obtained by Chahal and Bakshi (2015) and Chahal and Bakshi (2016). Specifically, in the present research, the results were: for absolute fit with RMSEA = .075, for incremental fit with TLI = 0.953, NFI = 0.948, and CFI = 0.967, for parsimony fit CMIN/DF = 2.672 (see Table 2).

Also, SEM was considered as a means to explain the relationship between KM, OL, and IC in the sector studied to test the hypotheses. The model starts with the first finding showing a positive relationship between OL and KM (cf. H_1 of structural and measurement model of knowledge management linked to organizational learning and intellectual capital, see Figure 1) as an explanation of the approach of Easterby-Smith and Lyles (2003) who theoretically point out, there is a relationship between OL and KM, considering that KM focuses on the content of knowledge. While the OL focuses on a vibrant knowledge-based process, which involves moving between the various levels of action, starting from the personal to the group level and then to the organizational level and back again.

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This relationship between the variables is also consistent with the findings of Abdi et al. (2018); Castañeda et al. (2018); Chawla and Joshi (2011); Ho (2008); Imran et al. (2017); Jain and Moreno (2015); Liao and Wu (2009); and Noruzy et al. (2013).

Likewise, Huerta-Chávez (2019) found in a theoretical way the relationship between the mentioned variables. In concomitance with the various authors and the results obtained in the structural and measurement model, it is possible to affirm the relationship between OL and KM (cf. H₁ of structural and measurement model of knowledge management linked to organizational learning and intellectual capital, see Figure 1).

The second finding in the model showed a positive relationship between IC and KM (cf. H₂ of structural and measurement model of knowledge management linked to organizational learning and intellectual capital, see Figure 1). To corroborate the theory is necessary to resort to researchers such as Bueno (1999), Koenig (1998), and Wiig (1997). This relationship was found by Caraballo et al. (2009), Hussi (2004), León et al. (2006), Ling (2013), Núñez (2014), and Sánchez et al. (2010), to mention a few.

Archibold and Escobar (2015) concluded that the existence of strategic KM capabilities, identifying, transmitting, and producing knowledge as an intangible asset, generates value and competitive advantages with human, structural, and relational capital, reiterating their relationship. In the same sense, Hussinkí et al. (2017) state that there is a relationship between IC and KM practices with the company's performance. Therefore, the companies characterized by high levels of IC and the use of KM practices are likely to outperform those with low levels of these two variables. The discussion carried out so far has allowed us to understand the results obtained, supported by theory.

Also, Vizcaíno et al. (2018) found that KM and IC are related and determine competitiveness. These variables efficiently managed will greater the competitiveness of companies. Now in agreement with Huerta-Chávez and Castro-Valencia (2019), it is possible to conclude that IC and KM are inseparable binomials for organizational improvement. At the same time, Huerta-Chávez (2019) shows the relationship between IC and KM in her theoretical model.

In concomitance with this second finding, Mendoza-Orellana (2019) evaluated IC as a critical success factor for performance improvement in KM processes, concluding that it is required to invest in IC through preparation and training to support its identity as an institution. Likewise, Ibarra-Cisneros et al. (2020) point out that KM theorists manage to connect it with IC. Therefore, KM helps institutions to use their IC for performance improvement. Their study corroborated the positive relationship between IC and KM.

Finally, the third finding in the model showed a positive relationship between IC and OL (cf. H₃ of structural and measurement model of knowledge management linked to organizational learning and intellectual capital, see Figure 1), which coincides with Bontis (1998) who states that both variables are united when IC is the unit of the inventory of OL flows. In this sense, there is a relationship between both variables (Abualoush et al., 2018; Archibold and Escobar, 2015; Chahal and Bakshi, 2015; Bueno, 1999; Caraballo et al., 2009; Chen et al., 2004; Huerta-Chávez, 2019; Huerta-Chávez et al., 2020; Koenig, 1998; Lennon and Wollin, 2001; León et al., 2006). So, IC occurs at all levels of the organization, just like OL, to improve organizations with knowledge (Angulo, 2017). Both variables start with knowledge as an intangible and valuable resource for the organization.

The discussion carried out so far, it is possible to comment the theoretical model elaborated proved to have adequate structural and measurement relationships by obtaining indexes above what is established in the statistical theory, presenting acceptable standardized adjustment indexes within the parameters (Hair et al., 1999) with values: CMIN/DF of 2.652, RMSEA of 0.075, TLI of 0.981, NFI of 0.982, and CFI of 0.989 (see Table 3). Therefore, the variables studied allow a closer explanation of the phenomenon, demonstrating the relationship between KM, OL, and IC.

Given that the model constructed proved to have a scale of valid and reliable indicators that allow measuring the individual variables or dimensions that make up the constructs or variables studied, starting from the review of various theoretical and empirical research, where studies show the influence between the constructs studied. However, few referred to the subject of study of this research, so the theoretical and empirical contribution is crucial.

Annexes

The items evaluated in the instrument are shown below (see Table 8).

Variable	Item
CK1	The institution has an efficient system for exploring internal and external information.
CK2	The information obtained from various sources is efficiently processed and integrated into the organization.
CK3	The institution has a system that allows it to identify important findings for its work from both internal and external sources.
CK4	Institution managers create new knowledge considering the system of exploration, detection of findings, and integration of information.
CK5	Institution managers interact with each other favoring the creation of knowledge.
SK1	Organization managers exchange knowledge with each other.
SK2	Organization managers transfer knowledge to each other.
SK3	Institution managers share knowledge with each other.
AK1	Institution managers apply the knowledge generated and shared.
AK2	Managers make decisions based on the application of previously generated knowledge.
ILL1	Institution managers learn by observing their co-workers.
ILL2	This institution offers staff opportunities to develop their skills to perform the job.
ILL3	In this institution, staff learns by following instructions, whether verbal or written.
GLL1	Institution staff learn enthusiastically when working in groups.
GLL2	Institution staff exchange knowledge freely when working in groups.
GLL3	When the institution works in a group, collective learning is achieved.
OLL1	Staff uses the knowledge that the institution has.
OLL2	The institution adapts in a timely manner to changes in the environment.
OLL3	The institution designs new products or services based on the knowledge of the personnel who work in it.
HC1	Staff training is ongoing.
HC2	Staff is highly educated.
HC3	Staff skills improve.

HC4	There is motivation to share new ideas.
HC5	Managers make staff happy.
HC6	The manager makes the staff satisfied.
SC1	The atmosphere in this institution is pleasant.
SC2	Managers and staff communicate well.
SC3	The increase in knowledge is well supported.
SC4	The institution develops new products and services.
SC5	There is great support for innovative ideas.
SC6	The institution improves the quality of service.
SC7	There is information on structures and systems.
SC8	There is easy access to information.
SC9	Processes develop unique capabilities.
SC10	The culture is supportive and comfortable.
RC1	User data is up to date.
RC2	Meetings with the user occur continuously.
RC3	The opinion of users is valued.
RC4	User feedback is shared across the institution.
RC5	Interactions improve competence.

Table 8 Items instrument

Source: Own elaboration (2023) based on Castañeda and Fernández (2007); Chahal and Bakshi (2015); Huerta-Chávez (2019); Huerta-Chávez et al. (2020); Rodríguez-Ponce (2007) instruments

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Conclusions and recommendations

Due to this, in the employees' public social assistance sector of Jalisco, KM is influenced by OL and IC. Likewise, there is a relationship between the latter since they presented significant factorial loads higher than .30 (Hair et al., 1999), corroborating the direct link between the variables studied. Added to this are the common elements between these variables, such as the human factor and the knowledge developed in people to generate value in the various organizations, making a distinction between one and the other.

It concluded OL influences KM, as it is a process based on knowledge of the employees' public sector participation. Which transforms and incorporates individual, group, and knowledge into organizational knowledge as a whole (Bueno, 1999) and implies moving between the different levels of action, starting from the personal to the group level and then to the organizational level and again. Also, for being a thought process and individual action are shared within an organizational context, while KM exists to focus on knowledge content (Easterby-Smith and Lyles, 2003; Rashman et al., 2009).

In this same sense, IC influences KM by concentrating on the renewal and maximization of the value of intellectual assets in organizations. That is, on the systematic and explicit detailed processes for value creation; while knowledge management focuses on the administration of knowledge flows (Wiig, 1997; Bueno, 1999).

Also, IC influences OL since it is considered the unit of the inventory of organizational learning flows. It starts from the existing IC and transforms into learning in organizations when shared from the individual to the group level and finally to the organizational level. Therefore, in public sector welfare organizations, bright people must also be supported and nurtured to share their human capital through OL (Bontis, 1998).

In conclusion, with the present investigation, it was possible to state that employees at all levels are a fundamental part of public sector social assistance institutions, where the constant search for innovative change from bureaucratic practices to a culture of collaboration is necessary for the generation and increase of OL and IC to have excellent KM and add value in the delivery of products and services for citizens. This innovative practice affects society's well-being and satisfaction, which every day is more informed and demands better products and public services.

At the same time, these innovative practices focused on the adequate KM, OL, and IC to retain knowledge, integrating it into the company as capital, contributing to knowledge leakage reduction, and coming with the knowledge workers transfer between various government agencies and even those employees who retire.

Therefore, it is possible to affirm that IC is the measure of added value, considered a background variable that helps explain the OL effectiveness and the KM efficiency (Bueno, 1999).

Now, the main conclusions reached from this study are: there is a significant relationship between the variables of the proposed theoretical model: OL and KM, IC and KM, as well as IC and OL. This was verified through multivariate analysis with structural equation modeling, where standardized adjustment indices were obtained within the statistical parameters and valid and reliable indicators, highlighting the importance of knowledge as added value in public institutions.

This research generates three main contributions: theoretical, practical and methodological. In the first instance, the theoretical contribution to the science of administration consisted in the generation of the analysis of the existing theory, as well as the comparison of results based on it, creating new knowledge, since from the theory a model with interrelation of the variables under study, which was verified empirically.

Immediately, the practical contribution consisted in the approach of new strategies for the public sector, based on the results obtained in the empirical study, setting the tone to promote strategic decision making and the establishment of improvement projects that strengthen good practices, organizational practices, on the part of the operational personnel, the middle managers and managers responsible for public institutions, so that the practices of knowledge management, organizational learning and intellectual capital promote the improvement of the actions of the employees of this sector, propitiating the change of bureaucratic practices to a culture of collaboration that affects the wellbeing of society, whose benefit will be mainly for the citizens who with their taxes pay in advance for public services.

Finally, the methodological contribution consisted in the integration of a valid and reliable instrument from the particular theoretical model, which was verified after the inclusion of new perspectives of informants, through an empirical test in the public sector of social assistance in Jalisco.

At the same time that, through the multivariate analysis, the constructs under study were interrelated, allowing the generation of knowledge that explained the variables analyzed, with potential use in the substantive improvement of management processes and for the establishment of new strategies in other public institutions.

Future research directions are:

- 1) Expand the study universe to other public sectors because the present investigation contemplated only the social assistance public sector.
- 2) Carry out confirmatory studies where the influence of the variables studied on organizational performance, integrating the citizens' perception in the reception of products and services from the public sector of social assistance.
- 3) Apply the instrument in other institutions, both in the public and private sectors, which can predict the behavior of the variables studied.
- 4) Integrate qualitative tools into the variables studied since the study was merely with a quantitative approach.

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