Cuban Journal of Public and Business Administration
ISSN 2664-0856 RNPS 2458 / Vol. 8 Num. 2 May-August (2024) / e325
Available in: https://apye.esceg.cu/index.php/apye/article/view/325

Original article

THE IMPACT OF STRUCTURAL COMPLEXITY ON KNOWLEDGE MANAGEMENT PROCESSES: A CASE STUDY OF THE FRIENDSHIP OPHTHALMOLOGY HOSPITAL ALGERIA CUBA IN DJELFA

EL IMPACTO DE LA COMPLEJIDAD ESTRUCTURAL EN LOS PROCESOS DE GESTIÓN DEL CONOCIMIENTO: UN ESTUDIO DE CASO DEL HOSPITAL OFTALMOLÓGICO DE LA AMISTAD ARGELIA CUBA EN DJELFA

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Classification JEL: C42, C51, H75,

DOI: https://doi.org/10.5281/zenodo.13363436

Received: 27/07/2024
Accepted: 14/08/2024

Abstract

The hospital is a complex system that includes several variables, and knowledge represents the most critical input that interacts in order to effectively meet patients' needs. The study sought to empirically

test the relationship between structural complexity and its dimensions: horizontal differentiation, spatial differentiation, vertical differentiation and knowledge management processes: acquisition, storage, distribution, and application among a sample of workers at the Friendship Ophthalmology Hospital Algeria Cuba in Djelfa. A questionnaire was designed to collect data from the study sample, and the data was processed and analyzed based on the SPSS 22 and Smart Pls 4 programs. The study yielded results, the most important of which are: There is a significant effect of horizontal and spatial differentiation on Knowledge management processes in the hospital. The study recommends adopting information and communication technology and integrating it into various hospital operations to simplify healthcare practitioners' tasks

Keywords: horizontal differentiation, spatial differentiation, vertical differentiation, knowledge management, hospital.

Resumen

El hospital es un sistema complejo que incluye varias variables, y el conocimiento representa el insumo más crítico que interactúa para satisfacer eficazmente las necesidades de los pacientes. El estudio buscó probar empíricamente la relación entre la complejidad estructural y sus dimensiones: diferenciación horizontal, diferenciación espacial, diferenciación vertical y procesos de gestión del conocimiento: adquisición, almacenamiento, distribución y aplicación entre una muestra de trabajadores del Hospital Oftalmológico de la Amistad Argelia Cuba en Djelfa. Se diseñó un cuestionario para recolectar datos de la muestra de estudio, y los datos fueron procesados y analizados con base en los programas SPSS 22 y Smart Pls 4. El estudio arrojó resultados, los más importantes son: Existe un efecto significativo de la diferenciación horizontal y espacial en los procesos de gestión del conocimiento en el hospital. El estudio recomienda adoptar tecnologías de la información y la comunicación e integrarlas en diversas operaciones hospitalarias para simplificar las tareas de los profesionales sanitarios.

Palabras clave: diferenciación horizontal, diferenciación espacial, diferenciación vertical, gestión del conocimiento, hospital.

Introduction

The features of competition in the world today include health care services as a pivotal dimension to which priority is given.[1] Hospital management constitutes a complex system, and healthcare quality is considered its most significant outcome. It is linked to several variables: healthcare service providers, structural characteristics, healthcare equipment, professional protocols, and Coordination mechanisms between healthcare professionals and patients.[2] On the other hand, hospitals face the pressures of providing appropriate health care to many patients and the corresponding limited time resources.[3] Therefore, all healthcare systems are required to provide adequate services based on a timely response to gain the satisfaction of their customers.[4] This requires changes in structural relationships and roles to overcome the difficulties that arise in health care.[5] Thus, complexity imposes itself in the healthcare environment to include the required knowledge behaviours, mechanisms for translating knowledge into practical practices, and ways to facilitate its application.[6]

The concept of structural complexity

Structural complexity measures how functions differ in aims, task orientation, and autonomy.[7] It also concerns how mechanisms allocate and manage tasks.[8] Structural complexity is associated with tasks that require multiple paths and solutions, differentiated goals, and a volatile environment.[9] Therefore, structural complexity corresponds to tasks that are challenging to complete because they are unfamiliar and non-routine, necessitating specialized knowledge and the ability to deal with novel problems. The complexity is related to an internally uncertain task environment, and the amount of information at the workplace level needs to be increased, as it requires participation between co-workers and the formation of work teams to address it.[10]

In the classical literature, the structural complexity is limited to the heterogeneity and lack of interdependence between tasks, which necessitates the fragmentation and division of administrative responsibilities and the analysis of administrative tasks to facilitate coordination between complex tasks.[11] Fredrickson(1986)[12] pointed out that structural complexity is represented by the difficulty of agreeing on goals and the lack of unification and consensus on how to reach them. Hence, Structural complexity is the performance of unusual tasks that require cooperation between groups in the organization and the exchange of information, so organizations were encouraged to participate as a group work, which is more valuable than individual work in terms of the ability to understand the issue, define its dimensions, and make a decision on it.[13,14] Structural complexity can be understood as situations where no individual can handle organizational decisions alone. It also includes jobs that require mutual adaptation rather than standard rules, standards, and practices to standardize behaviour.[15] In other words, structural complexity is limited to tasks that require access to specialized training and experience, division of responsibilities, and empowerment of individuals, as opposed to simple and routine tasks.[16]

Forms of structural complexity

Nevertheless, structural complexity is a response and reaction to the complexity of the organization's internal or external environment. The internal environment consists of the people, processes, and technologies that constitute the basic strategy of the organization. The external environment includes what the organization must respond to regarding customers, markets, suppliers, and competitors.[17] Complexity includes three forms of differentiation. Horizontal differentiation refers to the degree of separation between organizational units based on the skills of individuals and the nature of their tasks that require specialized knowledge. Thus, the complexity of the organization increases with the increase in the difference in occupations within the organization. Vertical differentiation relates to the depth of the organizational structure, which is explained by the number of hierarchical levels in the organization. Vertical differentiation is a response to increased horizontal differentiation. In contrast, spatial differentiation refers to the degree to which an organization's activities, offices, and staff are dispersed in different locations.[18]

Hall (1968)[19] claimed that differentiation in a job is primarily related to the variety of attitudes and behaviours of the organization's personnel, which results in different orientations towards precise goals, diverse viewpoints, and specific skills. Accordingly, the complexity must be studied through a

multidimensional approach that includes the characteristics and nature of individuals and decision-making approaches in addition to the contextual factors of the organization, such as technology, size, and culture.[20] Thus, structural complexity is a degree of internal division into parts of the organization. The indicators used to measure it are the number of general objectives of the organization, the number of departments and departments in the organization, the number of hierarchical levels of the organization, and the degree of dispersion of physical facilities and employees and their locations.[21]

In addition, the type of organization differs from the structural complexity according to the following indicators:

- Increasing the specialization of work and the accompanying creation of different jobs in the organization and attempting to create different jobs;
- Raising the volume of departments results in the division of responsibilities between departments;
- The control of employee behaviour;
- Decision-making delegation in the organization.

Characteristics of complex organizations

As a result, the design of more complex organizations requires relatively decentralized and less formal structures to increase the information exchange between the organization's members within the framework of informal organization spontaneously due to the interaction of individuals among themselves.[22]

Some researchers claim that high structural complexity facilitates innovations.[23] Structural complexity also contributes to the organization's effectiveness through strict supervision of the activities of subordinates.[24] It is associated with the complexity of the organization's tasks and results in increased training.[25] Moreover, organizations with more complex structures have an increasing rate of managerial communication between departments and also need a high flow of information and accurate diagnosis of organizational situations.[26,27] Thus, structural complexity requires an integrated system, data from different sources, resources and procedures for reasonable control in this system, and the harmony of the organization's internal organization between its various units and individuals is necessary.[28,29] Without a doubt, the design of structural complexity is characterized by multiple hierarchies to try to reduce errors at the organizational levels.[30]

Structural complexity and contextual factors of the organization

Generally, the degree of variation in structural complexity between organizations is explained by contextual factors: technology, size, environment, culture, and strategy. In organizations applying complex technology, the appropriate structure is the organic structure, and technology-specific organizational units are developed for work methods to be compatible with technological changes.[31] In the same context, when the size of the organization increases, it corresponds to an increase in the number of employees, the diversity of the organization's functions, and the multiplicity of the locations of the organization's departments, which creates the difficulty of coordination between them and it is necessary to formalize in order to program the behaviour of the organization's personnel.[32] Organizations require different information in quantity and type according to the context of the

environment in which it operates.[33]

Organizations operating in a complex environment must make decisions against ambiguous information, rapid change, and more ability to predict results.[34] In addition, each organization has its appropriate values, ideas, and beliefs to regulate the behaviour of individuals so that the work is done. Implementing organizational activities is a guiding principle.[35] To achieve the organization's goals, leaders must have a complete and diverse understanding of the organization's culture.[36] Also, for the organization to exploit the range of available opportunities, it must adapt the rules and procedures of the structural design following its strategic choices.[37] Strategy is a complex structure that reflects the interactions of the organization's parts and resources with its internal and external environment.[38] Accordingly, organizations with complex strategies seek to be more flexible and adaptive to the changes surrounding them.[39]

Organizational structure and knowledge management processes

The success of organizations and enhancing their competitiveness requires the adoption of systematic coordination of knowledge operations departments and control of the barriers that hinder them, whether internal barriers such as organizational structure and culture or external environmental factors. The organizational structure provides options for managing knowledge processes and the correct course from the beginning knowledge creation until its implementation.[40] Therefore, organizations work to find dependent relationships between their departments to acquire knowledge from various internal and external sources and preserve their knowledge resources.[41]

The concept of knowledge and knowledge management

Knowledge is a combination of experience, values, and information that arises in the minds of individuals.[42] It is a translation of the values, principles, and cultural norms of the organization's members that are embodied and organized according to its structure.[43] However, knowledge management is a set of procedures and methods for creating, assembling, and applying knowledge following the principles of designing the organization to achieve the planned goals.[44] It is also the process of the organization's awareness of its individual and collective knowledge and working on directing it to achieve sustainable excellence.[45] Knowledge management allows acquiring knowledge from various internal and external sources and distributing it among the organizational levels to benefit from it effectively.[46] It also allows the organization to create, organize, disseminate, and apply knowledge to meet its challenges and develop methods, techniques, and organizational values that enhance the flow of knowledge among individuals.[47] Thus, knowledge management is an integrated system that creates and applies knowledge to serve the organization's goals.[48] Consequently, Knowledge management represents a set of organizational activities and processes, the aim or purpose of which is to create knowledge and work to preserve it, in addition to transferring and sharing it until it is applied in the organization.

Organizational knowledge mediates the relationship between an organization's contextual factors, such as strategy, structural design, and the culture of its people.[49] It is the strength and basis of competition between organizations, and excellence lies in managing it properly to keep pace with changes in the business environment.[50] Knowledge varies according to the individual and accumulates

through the knowledge base acquired by the individual.[51] It is not limited to exploiting existing knowledge but generating new knowledge that serves the organization's goals is possible.[52] Structural complexities characterize the types of knowledge. Explicit knowledge is formal and systematic, which is expressed in words or numbers and can be documented or stored in databases.[53] Unlike tacit knowledge, it is knowledge that is rooted in the minds of individuals, such as technical skills, where it is difficult to encode and store.[54] Tacit knowledge is reflected in the actions and behaviours of the organization's members.[55]

The tacit knowledge is transformed into explicit knowledge through dialogue between the organization's members.[56] Among the obstacles to converting tacit knowledge into explicit knowledge is the opportunism of individuals for knowledge and a desire for power. Also, the organizational structure relies on high specialization, which hinders interactions between individuals, the improper establishment of powers, overlapping goals, and lack of motivation for individuals. The way of planning and physical distribution of offices affects the way of communication between individuals.[57]

Knowledge management processes

Organizations practice their activities in knowledge management through knowledge acquisition, knowledge storage/retrieval, knowledge sharing, and knowledge application. Knowledge acquisition is the process of obtaining knowledge from various internal or external sources, as it is considered a strategic commitment to the organization.[58] Storage/retrieval of knowledge refers to preserving existing knowledge based on traditional means such as written documents or advanced technology such as databases.[59] Sharing knowledge is represented in the exchange of knowledge between the organization's members in formal ways, such as through reports and notes or informal organizations of individuals in the work environment.[60] Thus, knowledge sharing is related to the coordination mechanisms between the units adopted by the organization.[61] Supervisors in the organization are considered the essential sources for sharing and distributing Their knowledge to the subordinates.[62] At the same time, applying knowledge refers to using the existing knowledge base in the organization to solve organizational problems and achieve added value.[63] In this regard, by tracking knowledge management processes, the most crucial process is the application of existing knowledge and its embodiment in the field. Knowledge without application does not create added value for the organization.

Organizational design and supporting knowledge management processes

In addition, the organizational structure is a supportive mechanism for knowledge management processes. Organizations adopt organizational structures that allow the creation of diverse knowledge and its flow in all parts of the organization easily without any obstacles to working on merging and coordinating between them, adopting flexible structural designs that promote team behaviour and encourage collaboration and knowledge sharing, providing knowledge infrastructure that works on the effective division of responsibilities and the use of guidelines that help in the effective management of knowledge operations.[14,64,65]

As well as adopting the horizontal organizational structure and administrative empowerment policies for sharing and distributing knowledge in the organization, designing a motivating work environment

for individuals, and increasing interactions to exchange knowledge.[66,67]

C. J. Chen & Huang(2007) illustrated that the organizational structure is one of the elements of the organizational climate that affects knowledge management processes and contributes to the embodiment of social interaction, which appears more in decentralized and less formal organizations.[40] The organizational structure also positively affects the sharing and application of knowledge among the organization's members.[64] stated that the difference in knowledge management processes is according to the different structural designs approved by the organization and the adoption of flexible structural designs that encourage interactions between individuals to share knowledge and effectively manage it. According to Bhatt(2001),[66] the hierarchical organizational structure hinders the flow of knowledge in contrast to the horizontal structure that contributes to sharing knowledge across organizations.

It is also possible to utilize the characteristics of structural complexity to advance knowledge management goals. Knowledge management practices follow the organizational structure's design mechanisms in this context. In structurally complex organizations, knowledge is fragmented between departments and units, which necessitates the creation of special units in the structure to capitalize on the knowledge. It happens according to the specificity of the organization and its knowledge needs.[68] Furthermore, the most critical barriers to knowledge sharing in organizations are individual, technological, and organizational barriers. The importance of the flexible structure as a supporter of knowledge sharing, and organizations should study the obstacles to employee communication and knowledge sharing.[69] For instance, most studies agree on the interdependence and integration between flexible structures and knowledge management processes. However, the specificity of the activity of some organizations does not enable them to adopt flexible structures because they need to meet the current and future requirements of the organization. Therefore, the appropriate strategic options impose the adoption of structural complexity in its dimensions and an attempt to reconcile it with Knowledge management processes.

Materials and Methodology

The study literature and information related to the dimensions of structural complexity and knowledge management require the organization appropriate to the problem to have its outputs based on the skills and knowledge of its individuals rather than organizations based on simple tasks that require mutual adaptation and unification of individuals' behaviors. Thus, the Algeria- Cuba Friendship Ophthalmology Hospital in Djelfa, Algeria, is the appropriate organization to study the research problem.

The questionnaire was designed based on previous literature related to the study variables. In the first stage, we obtained the acceptance of the hospital's general director for the field study procedures and determined a time frame for them. Among the receiving organization's amendments, the hospital administration stipulated that the questionnaire must be in Spanish as the hospital's doctors' native language. Then, the hospital's Cuban party coordinator received the first final version for arbitration. Based on his opinions, the content was modified. Hence, some items that did not comply with hospital policy were deleted, and others were drafted to their final form.

Among the most significant proposed amendments. The item "My work involves a great deal of interaction with people outside the hospital." The item "I find it challenging to communicate with my colleagues in the hospital." was changed to "I interact with my colleagues in the hospital." reformulating the item, "I get the knowledge I need to work in the hospital by myself." to "I know the necessary to do in my work in the hospital on my own." Deleting the item "The hospital relies on the archive to preserve knowledge." As for the study population, the questionnaire distribution was limited to a certain number of the population, and the hospital administration took responsibility for that. Also, most of them were reluctant to answer.

The first purpose of this research is to know the responses of the sample members to the various items of the scale contained in the questionnaire. Then, to conclude the sample direction for each item of the study. The research relied on a five-point Likert scale based on 5 points. **Table 1** shows this.

Table 1. Five-point Likert scale tool

Scale	Level	Range
1	Never	]1,79-1,00]
2	Rarely	]2,59-1,80]
3	Occasionally	] 3,39-2,60]
4	Frequently	]4,19-3,40]
5	Always	[5,00-4,20]

Statistical analysis of the sample's views

Structural complexity variable

It is clear from **Table 2** that item 04, "My employment requires me to analyze hospital information." is the highest among the means, with a mean of 3.2400 and a standard deviation of 1.42244. The trend of this item may be explained by the difficulty of meeting the needs of patients and the lack of ways to standardize the response to different conditions and health problems. It is consistent with De Jonge et al.(2001)[70] study that concluded that in order to manage hospitals successfully, the latter requires complex knowledge as a result of the impossibility of adopting a unified diagnosis for all patients, the multiplicity of therapeutic interventions and consultations, and the need for strong coordination between various medical staff, including doctors and nurses. In addition, item No. 03, "The outcomes of my work contribute to the hospital careers of others." came in last place, with a mean of 2.9200 and a standard deviation of 0.996660. This result refers to the difficulty of relying on the results of the various components of the staff and the need for more cooperation between the various organizational units in the hospital.

Table 2. Horizontal differentiation dimension

No.	Item	Mean	SD	Trend
1.	It took time to learn the equipment used in the hospital. Me tomó tiempo aprender el material que se usa en el hospital.	2.2400	1.36260	Rarely
2.	I use a variety of skills in the hospital in order to complete my work. Uso una variedad de habilidades en el hospital para completar mi trabajo	3.1200	1.39403	Occasionally

3.	The outcomes of my work contribute to the hospital careers of others. Los resultados de mi trabajo contribuyen al trabajo de los demás.	2.9200	0.99666	Occasionally
4.	My employment requires me to analyze hospital information. Mi trabajo requiere que usé y analicé mucha información en el hospital	3.2400	1.42244	Occasionally
5.	The organizational goals in the hospital are multiplicity and diversity depending on the diversity of the departments. En la organización del hospital, cada departamento tiene una serie de objetivos diversos.	3.0400	1.30639	Occasionally

Source: elaborated by researchers based on outputs of SPSS 22 software.

Table 3 shows item No. 10, "Information flows in the hospital to multiple administrative levels." is the highest among the means, with an arithmetic mean of 3.1600 and a standard deviation of 1.59896. The trend of this item directs to the multiplicity of hierarchical levels, the engagement of decision-making authority with the manager, and the lack of work on the principle of delegation. The research of Parand et al.(2014)[71] concluded that one of the tasks of hospital managers is to make decisions and formulate various administrative procedures and policies that ensure the provision of quality healthcare services. Also, Item No. 08: "There is more than one official in the hospital from whom I take orders." It came with an arithmetic mean of 2.6000 and a standard deviation 1.58114. The trend of this item is explained by the multiple scopes of supervision for each individual due to the overlapping of the responsibilities assigned to them. Furthermore, it refers to the need for more understanding of them completely and correctly.

Table 3. Vertical differentiation dimension

No.	Item	Mean	SD	Trend
1.	I find it challenging to communicate with the upper levels of hospital administration. Me resulta difícil comunicarme con los niveles superiores de la administración del hospital.	1.8400	1.24766	Rarely
2.	There are multiple steps to permit the completion of my duties in the hospital. Hay varios pasos para autorizar el cumplimiento de mis funciones en el hospital.	2.9200	1.57903	Occasionally
3.	There is more than one official in the hospital from whom I take orders. Hay más de un funcionario en el hospital de quien recibo indicaciones.	2.6000	1.58114	Occasionally
4.	The hospital management reviews the organizational relationships between the administrative levels continuously. La dirección del hospital revisa las relaciones organizativas entre los niveles administrativos de forma continua.	2.7600	1.20000	Occasionally
5.	Information flows in the hospital towards multiple administrative levels.	3.1600	1.59896	Occasionally

	La información fluye en el hospital hacia múltiples niveles administrativos.			

Source: elaborated by researchers based on outputs of SPSS 22 software

Table 4 depicts item No. 12. "The hospital's activities are spread over different locations." is the highest among the means with an arithmetic mean of 3.6400 and a standard deviation of 1.52425. The trend of this item was frequent. Thus, spatially dispersed units and departments require effective coordination, as each patient is subject to fragmented health services across the hospital's physical locations. Tamuz & Harrison(2006)[72] claim that hospitals are unique in their organization compared to other departments and the interaction of their parts in an organized and bureaucratic manner to achieve multiple goals within the framework of a complex and distinct system. The item "The hospital's activities are spread over different locations." came last. The trend of this item was rare. Hence, the hospital is activating multiple medical specialties, which makes it difficult to cooperate and work collectively with parties outside the hospital's affiliation. In this regard, Mamédio & Meyer (2020)[73] argued that high complexity exists in hospitals due to several factors, the most important of which are the specificity of the services provided, the techniques and technology used, the type of skills and knowledge required, and unexpected situations.

Table 4. Spatial differentiation dimension

No.	Item	Mean	SD	Trend
1.	The hospital assigns the completion of some tasks to other institutions to achieve them better. El hospital asigna la realización de algunas tareas a otras instituciones.	2.0800	0.99666	Rarely
2.	The hospital's activities are spread over different locations. Las actividades del hospital se reparten en diferentes servicios	3.6400	1.52425	Frequently
3.	I interact with my colleagues in the hospital. Me relaciono con mis compañeros en el hospital.	3.2800	1.54164	Occasionally

Source: elaborated by researchers based on outputs of SPSS 22 software

Generating and acquiring knowledge

Table 5 above states that in item 16, " I get the knowledge I need to work in the hospital by myself." It is the highest among the averages, with an arithmetic mean of 3.2400 and a standard deviation of 1.56205. The trend for this item was occasionally. It explains that the complexity in hospitals encourages work based on a shared vision of knowledge and expertise and the formation of work teams that promote finding solutions to patients' cases. In the same context, Costa et al.'s (2014)[74] study confirms that one of the most critical challenges healthcare workers face is finding the correct diagnosis for patients' cases based on their knowledge.

Table 5. Knowledge management axis

No.	Item	Mean	SD	Trend
1.	The interaction between me and my colleagues increases the generation of new knowledge in the hospital. Existe un intercambio entre mis colegas y yo para generar nuevos conocimientos e ideas en el hospital.	2.8800	1.36382	Occasionally

2.	I participate in teamwork to gain new experiences in the hospital. Participo en trabajo en equipo para adquirir nuevas experiencias en el hospital.	2.8400	1.28062	Occasionally
3.	I get the knowledge I need to work in the hospital by myself. Tengo los conocimientos necesarios para realizar mi trabajo en el hospital por mi cuenta	3.2400	1.56205	Occasionally
4.	Training programs in the hospital help me to acquire new knowledge. Los programas de formación en el hospital me ayudan a adquirir nuevos conocimientos.	2.4400	1.22746	Rarely
5.	I write down the experiences I do in the hospital. Anoto las informaciones que hago en el hospital.	2.7200	1.36991	Occasionally
6.	The hospital uses software to store knowledge. El hospital utiliza software para almacenar conocimiento.	3.0400	1.39881	Occasionally
7.	I keep my colleagues updated on the knowledge I gain in the hospital. Mantengo actualizados a mis colegas sobre los conocimientos que adquiero en el hospital.	3.2400	1.20000	Occasionally
8.	The hospital seeks to facilitate sharing knowledge with my colleagues by organizing training courses. El hospital busca facilitar el intercambio de conocimientos con mis colegas mediante la organización de cursos de formación	1.8800	.88129	Rarely
9.	I use the technological facilities to share knowledge with my colleagues in the hospital. Utilizo las instalaciones tecnológicas para compartir conocimientos con mis compañeros del hospital.	2.4000	1.41421	Rarely
10.	The Internet is the most important means of delivering knowledge in the hospital. En el hospital, Internet se utiliza como el medio más importante para transmitir conocimientos.	3.0400	1.61967	Occasionally
11.	I help my colleagues apply their knowledge in the hospital. Ayudo a mis compañeros a aplicar sus conocimientos en el hospital.	2.8400	1.21381	Occasionally
12.	The hospital administrators continually assess my knowledge. Estoy sujeto a evaluación continua por parte de los jefes de hospital para asegurar mis conocimientos.	2.0000	1.04083	Rarely

Source: elaborated by researchers based on outputs of SPSS 22 software

Knowledge storage

Item No. 19: "The hospital uses software to store knowledge." It is the highest among the averages, with an arithmetic mean of 3.0400 and a standard deviation 1.39881. This item trend was occasionally. This result is explained by not relying entirely on technology to store knowledge, as there is implicit knowledge due to complex experiments to extract and declare. For instance, according to de Zwart et

al.(2023)[75] research, the complexity of hospitals requires adapting to changing circumstances and making decisions that require special knowledge and skills to deal with cases and their various treatment options.

Share knowledge

Item No. 20 states, "I keep my colleagues updated on the knowledge I gain in the hospital." is the highest among the means, with a mean of 3.2400 and a standard deviation of 1.20000, and the trend for this item was occasionally. It is explained that to value the customary storage in the hospital, the tacit knowledge of individuals must be brought out through dialogue and informal organizations in the hospital. This is confirmed by item 22, "I use the technological facilities to share knowledge with my colleagues in the hospital." which came in last place. This is consistent with Lee et al. 2014 study,[76] which claimed that good hospital performance outcomes are associated with a solid organizational culture promoting knowledge sharing.

Application of knowledge

Item No. 24, "I help my colleagues apply their knowledge in the hospital." is the most increased among the means, with a mean of 2.8400 and a standard deviation of 1.21381. The trend of this item was occasionally. It can be explained by the fact that the complex structure of the hospital results in the isolation of departments and may not allow for common spaces between individuals to exchange information and disseminate best practices for applying knowledge.

Study model

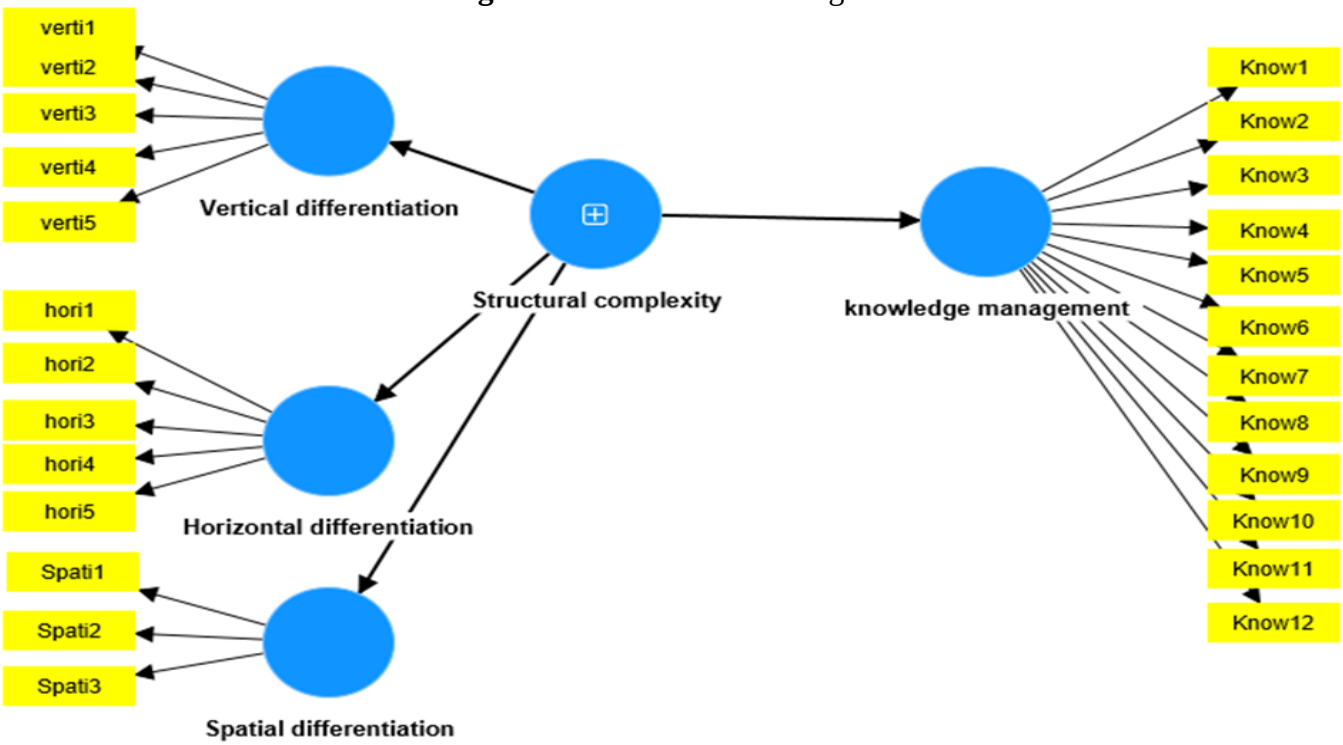
The model is established by studying the impact of structural complexity and its dimensions on knowledge management processes at the Friendship Algeria Kuba Ophthalmology Hospital in Djelfa. The study model was proposed using the structural equation modelling method using the partial least squares method. The study includes an independent variable related to structural complexity in three dimensions (**Figure 1**). The dependent variable relates to the knowledge management dimension. **Table 6** depicts this:

Table 6. Items model description

Dimension	Items
Horizontal differentiation	Hori1, Hori2 ,Hori3 ,Hori4
Vertical differentiation	verti1, verti2, verti3, verti4 ,verti5
Spatial differentiation	Spati 1,Spati2 ,Spati 3
knowledge management	Know1,Know2,Know3,Know4,Know5,Know6, Know 7,Know8,Know9,Know10,Know11,Know12

Source: elaborated by researchers based on outputs of smart pls 4 software

Figure 1. PLS-Model building



Source: elaborated by researchers based on outputs of smart pls 4 software

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Study model test:

Evaluation of the measurement model: The criteria of convergent validity and discriminant validity are used to evaluate the accuracy of items and the suitability of scale measurement.

Convergent validity

To verify the convergent validity of the study measurement, loadings, composite reliability, and average extracted variance are measured, as shown in **Table 7**:

Table 7. Construct Reliability and Validity

Constructs	CR	AVE	Items	Factor Loadings
Horizontal differentiation	0.859	0.558	Hori1	0.501
			Hori2	0.883
			Hori3	0.783
			Hori4	0.703
			Hori5	0.806
Vertical differentiation	0.833	0.532	verti1	0.182
			verti2	0.791
			verti3	0.870
			verti4	0.842
			verti5	0.732

Spatial differentiation	0.675	0.411	Spati 1 Spati2 Spati 3	0.645 0.704 0.566
knowledge management	0.804	0.337	Know 1 Know2 Know3 Know4 Know5 Know6 Know7 Know8 Know9 Know 10 Know11 Know12	0.879 0.818 0.798 0.254 0.251 0.995 0.784 0.149 0.426 0.585 0.850 0.899

Source: elaborated by researchers based on outputs of smart pls 4 software

It is clear from **Table 6** that there are some items whose saturations were less than the criterion specified for full acceptance of 0.40. Thus, they must be deleted due to their impact on the standard model's composite reliability, internal consistency, and discriminant validity. Meanwhile, item saturation is between 0.40-0.70. In that case, it will be necessary to verify the effect of deleting this item on raising the value of the rest of the standards of the structural model. On the other hand, the items whose saturation equals or exceeds 0.70 are kept because they belong to this dimension. After the process of deleting the items and improving the model, **Table 8** is formulated.

Table 8. Construct Reliability and Validity

Constructs	CR	AVE	Items	Factor Loadings
Horizontal differentiation	0.859	0.741	Hori2 Hori3 Hori5	0.890 0.867 0.823
Vertical differentiation	0.887	0.663	verti2 verti3 verti4 verti5	0.782 0.885 0.852 0.728
Spatial differentiation	0.740	0.588	Spati 1 Spati 2	0.732 0.801
Knowledge management	0.913	0.677	Know 1 Know3 Know7 Know11 Know12	0.895 0.828 0.825 0.748 0.812

Source: elaborated by researchers based on outputs of smart pls 4 software

Discriminant validity

1. **Cross -loading test**

The cross-loading test aims to ensure that the items represent the dimension to which they belong. For this reason, their values must be higher than the rest of the dimensions. **Table 9** demonstrates that the study axes do not overlap and that the variables are independent and belong to the dimension they represent.

Table 9. Cross-loading test

	Knowledge management	Spatial differentiation	Vertical differentiation	Horizontal differentiation
Know 1	0.895	0.425	0.687	0.623
Know3	0.828	0.453	0.588	0.718
Know7	0.825	0.708	0.674	0.633
Know11	0.748	0.407	0.805	0.679
Know12	0.812	0.172	0.606	0.53
Spati1	0.394	0.732	0.37	0.364
Spati2	0.434	0.801	0.466	0.451
Hori2	0.751	0.53	0.890	0.88
Hori3	0.672	0.393	0.867	0.756
Hori5	0.706	0.489	0.823	0.54
verti2	0.594	0.557	0.672	0.782
verti3	0.722	0.363	0.796	0.885
verti4	0.724	0.339	0.72	0.852
verti5	0.45	0.495	0.575	0.728

Source: elaborated by researchers based on outputs of smart pls 4 software

1. variable correlation

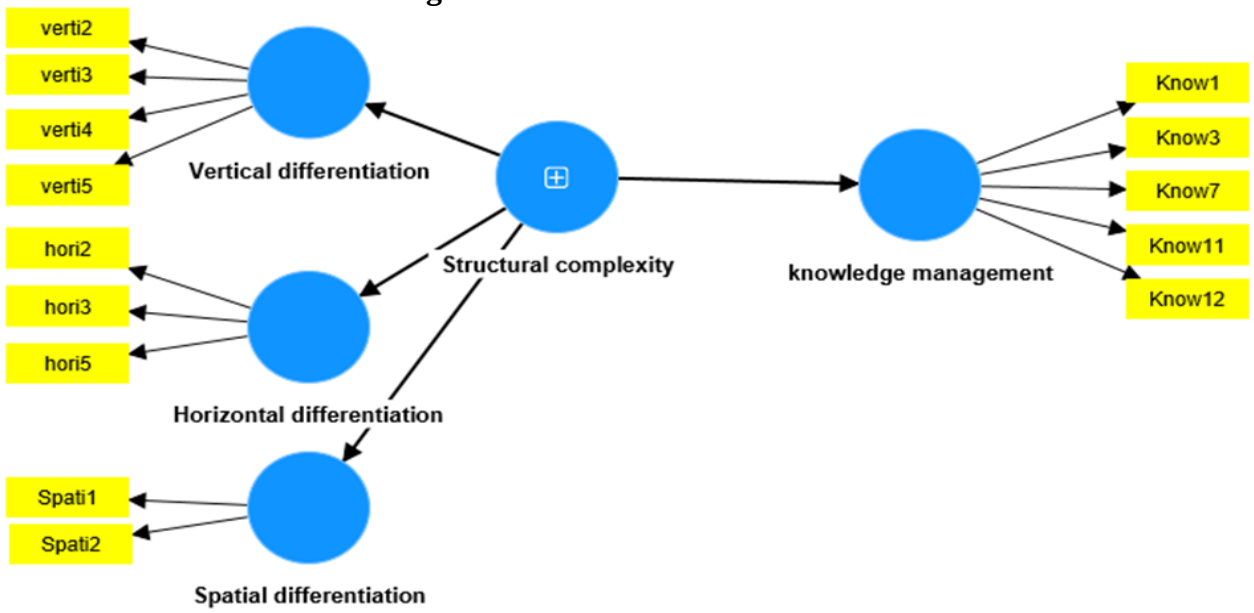
Fornell Larcker criterion: This criterion compares the square root of the AVE values with other correlations of the latent variable (**Table 10**). Thus, the square root of the AVE value for each construct must be greater than its highest correlation with any other construct. (**See Figure 2**)

Table 10. Fornell Larcker test

	Spatial	Horizontal	Knowledge	Vertical
Spatial differentiation	0.767			
Horizontal differentiation	0.548	0.861		
Vertical differentiation	0.534	0.855	0.81	
Knowledge management	0.540	0.797	0.760	0.776

Source: elaborated by researchers based on outputs of smart pls 4 software

Figure 2: PLS-Model final model.



Source: elaborated by researchers based on outputs of smart pls 4 software

Structural model evaluation

The structural model is evaluated using a set of criteria. The coefficient of explanation or determination implies the capacity of the structural complexity to explain the changes that occur in the knowledge management variables. The value of the coefficient of determination, R^2, ranges from 0 to 1, and levels close to 1 reveal increased predictive accuracy (**Table 11**). The effect size indicator f^2, a significant tool, is utilised to analyse and determine the size of the effect of structural complexity on knowledge management (**Table 12**).

Table 11. Coefficient of Determination (R^2)

Construct	R-Square	R-Square adjusted
knowledge management	0.795	0.766

Source: elaborated by researchers based on outputs of smart pls 4 software

Table 12. effect size results

	Knowledge management
Spatial differentiation	0.698
Horizontal differentiation	0.330
Vertical differentiation	0.007

Source: elaborated by researchers based on outputs of smart pls 4 software

The Smart PLS program is used to test the study hypotheses. This program relies on path analysis using Bootstrapping, which focuses on the path coefficient, T-values, and p-values. **Table 13** depicts this.

Table 13. Specific Indirect Effects

	Sample mean	STDEV	T-Values	p-Values
Spatial differentiation	0.440	0.140	3.313	0.001
Horizontal differentiation	0.514	0.138	3.521	0.000
Vertical differentiation	0.087	0.142	0.547	0.585

Source: elaborated by researchers based on outputs of smart pls 4 software

Table 13 shows how the dimensions of structural complexity were independently tested on the knowledge management processes of the Friendship Algeria Kuba Ophthalmology Hospital in Djelfa City. The first sub-hypothesis: The probability value of the spatial differentiation variable is 0.001, which is less than the significance level of 0.05, and therefore, the alternative hypothesis H1 is accepted. The spatial differentiation dimension statistically affects knowledge management processes at the Friendship Algeria Kuba Ophthalmology Hospital in Djelfa City.

The second sub-hypothesis: the probability value of the horizontal differentiation variable is 0.000, which is less than the significance level of 0.05. Therefore, we accept the alternative hypothesis H1, which states that there is a statistically significant effect of the horizontal differentiation dimension on the knowledge management processes at the Friendship Algeria Kuba Ophthalmology Hospital in Djelfa City.

The third sub-hypothesis: the probability value of the vertical differentiation variable is 0.585, which is greater than the significance level of 0.05. Therefore, the null hypothesis H0 is accepted, which states no statistically significant effect of the vertical differentiation dimension on knowledge management processes at the Friendship Algeria Kuba Ophthalmology Hospital in Djelfa City.

Conclusion

Organizational structure design policies vary according to several considerations, the most important of which are the organizations' specificity and activity and the mechanisms adopted for coordination between their parts. Accordingly, this study sought to test the relationship between the dimensions of structural complexity in the Friendship Algeria Cuba Ophthalmology Hospital practices in Djelfa and knowledge management processes. Health organizations are composed of a complex system that contains disparate inputs represented by the external environment of the hospital, individual practitioners with their various knowledge, and patients, and the goal of their outputs is to achieve quality health results.[77]

Thus, emphasis must be placed on knowledge management processes, as hospital management requires effective management of its professional knowledge to make decisions that achieve high-quality services for patients and the hospital achieve a good reputation,[78] especially with the recommendations imposed by the coronavirus pandemic, which require searching for future trends in the field of hospital organization and management.[79] In this regard, one of the most essential regulatory standards in place in the field of health organizations is to benefit from developments in the technology environment to discover solutions to complex health cases.[80] In addition, creating

functions in organizational structures reduces the pressure on doctors due to the complexity of their tasks and the overlap of their responsibilities.[81] Hospitals are complex systems requiring strategic choices to structure knowledge acquisition and dissemination at all organizational levels properly.[82] All this is done to effectively produce multiple options to meet the hospital's needs.[83]

The current research concluded that spatial and horizontal differentiation had a significant effect on knowledge management processes in the organization studied. However, vertical differentiation has no statistically significant effect on knowledge management processes. Thus, spatial differentiation results in the fragmentation of health care for patients between different physical locations, leading to obstructed communications between them and delayed access to information, negatively affecting the diagnosis of patients' cases. However, the hospital administration overcame the obstacles of spatial differentiation by targeting knowledge management processes by adopting communication technology and integrating it into hospital operations.

Regarding horizontal differentiation in the organization, we notice the process of arranging hospital departments based on hospital-specific functions such as examinations A, examinations B, and the surgery unit. Each department specializes in a specific healthcare field and has a range of knowledge, experience and medical equipment in addition to various supporting departments such as laboratory and radiography. They work together in an integrated manner because each department has a deep understanding of its field of specialization, which facilitates the application of knowledge. The outputs of each department are the inputs of the department with which it is linked. Therefore, coordination between departments must be strengthened to acquire new knowledge and skills that improve the outcomes of hospital operations.

As for vertical differentiation in the organization, it is noted that there are multiple hierarchical levels in the hospital, and the concentration of decision-making authority with the director results in the flow of information across Many levels, which leads to a delay in the dissemination of knowledge. In addition, knowledge may be monopolized at higher levels, while lower levels have incomplete and unclear knowledge. The research points out the lost knowledge that cannot be stored in the hospital's knowledge repositories.

Furthermore, systems that align with technological developments must be adopted to effectively manage knowledge and overcome the negatives of multiple hierarchical levels, delegating some powers and empowering individuals.

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Conflicting Interests:
The authors report no conflicts of interest.

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