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Development and Validation of a Knowledge Management Questionnaire for Hospitals and Other Healthcare Organizations

Ioanna Karamitri [1], Fotis Kitsios [2] and Michael A. Talias [1,*]

[1] Healthcare Management Postgraduate Program, Open University Cyprus, P.O. Box 12794, Nicosia 2252, Cyprus; ioanna.karamitri@st.ouc.ac.cy

[2] Department of Applied Informatics, University of Macedonia, 156 Egnatia Street, 54636 Thessaloniki, Greece; kitsios@uom.gr

* Correspondence: michael.talias@ouc.ac.cy

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Abstract: Sustainable societies need to consider the connection between knowledge management (KM) and healthcare as a critical issue for social development. They need to investigate how to create knowledge and identify possible predictors of knowledge-sharing behavior that can support a hospital's sustainable knowledge-management strategy. KM strategies could help managers to increase the performance of hospitals and other healthcare organizations. The purpose of this paper is to present a valid and reliable questionnaire about KM in healthcare organizations. We develop a new knowledge-management questionnaire based on the use of an extensive literature review and health professionals' consensus. The Applied Knowledge Management Instrument (AKMI) questionnaire was pilot tested and retested on a small group of employees of healthcare organizations (n = 31). After the pilot process, a larger group of health professionals (n = 261) completed the questionnaire. Further investigation resulted in item reduction and verification of the dimensions of AKMI. Finally, we explore the psychometric properties of the developed tool. The developed questionnaire seems to be reliable, valid, and suitable to be used for studying the suggested nine dimensions of KM: perceptions of KM, intrinsic and extrinsic motivations, knowledge synthesis and sharing, cooperation, leadership, organizational culture, and barriers. The developed questionnaire can help policymakers and hospital administrators collect information about KM processes in healthcare organizations and this can result in higher performance of health organizations.

Keywords: knowledge management; knowledge creation; healthcare organizations; hospital; organizational learning; sustainable knowledge management; strategy; validation; questionnaire; quality of care

1. Introduction

Knowledge is a valuable resource for the growth of individuals and organizations. It represents a cognitive framework that makes possible the meaning and understanding of raw data and information [1] and sometimes leads to wisdom [2]. Scientists distinguish two types of knowledge, explicit and implicit [3–5]. Explicit knowledge can be expressed through words, numbers, or figures and represents the tip of an iceberg. Most of our knowledge is tacit, and it is hard to formulate and share. It is what Michael Polanyi [6] said: "We can know more than we can tell".

The cornerstone of knowledge creation and transfer theory was introduced by Nonaka and Takeuchi [5] with the SECI model. Since knowledge increases with interaction, it can be articulated and amplified in various entities where individuals cooperate, like businesses and other organizations,

making them sustainable [7]. In the past, scientists insisted on the personal character of knowledge. Next, many agreed that organizational culture exists, especially the heuristic knowledge that is developed by employees while working. Organizational knowledge is achievable when organizations sustain a spirit of cooperation, motivate their personnel, and encourage them to innovate, which means that they have competent management [8].

Management embraced knowledge and, around the 1990s, a contemporary business philosophy attracted the interest of executive officers, researchers, and scholars. In this way, the interest in knowledge management (KM) has grown and has been sustained. An increasing amount of digitized information is available because the decision-maker allows an organization to outperform its competitors. The complexity of modern business needs proper information to minimize errors and ensure future success [9], and the need for quality and best economic outcomes within the business strategy management framework [10].

The definition and conceptualization of knowledge management are not easily distinguished [11] mainly because of the two disjointed approaches that identify KM as technology-centered and people-centered. The first suggests that KM resembles information system management, which uses high technology to make information available and accessible at the right time for the users. The latter focuses on managing knowledge via human resource management practices [12]. The perspective of this article is human-orientated. Like other scientists, we believe that information and communication systems are tools for effective knowledge management and that attention should be focusing on the human, organizational and cultural aspects of knowledge management [13]. Healthcare organizations are examples of the balance between humans and engines. Even if the provision of health services relies on modern technologies, health professionals take the final decision for the diagnosis and treatment of the patient.

As Peter Drucker, the renowned professor, stated [14], "Hospitals are the most complex human organizations ever derived . . . and the fastest-growing in all developed countries". Even medium-sized hospitals occupy hundreds of employees from various scientific fields, educational backgrounds, socioeconomic status, and occasionally different cultures. Different groups of employees often have their regulations, perspectives, requirements, and accreditation. Still, they have to interact, cooperate, share information, transform it into knowledge, and perform efficiently to provide high-quality services to the patients and their caregivers. Consequently, it is difficult to share experiences and make comparisons between healthcare settings and other types of organization, and these should be studied independently via their social context and norms.

Healthcare agencies are late adopters of KM philosophy compared to the business sector [15]. Therefore, healthcare experts have just recently started to show interest in research for evaluating the existence and quality of a knowledge environment in hospitals. In 2015, we conducted a systematic review of knowledge management practices in healthcare settings. We accessed three databases (Medline, Cinahl, and Health Source: nursing/academic edition) for 10 years (1/1/2004-25/11/2014) and retrieved 604 articles, of which 20 articles were eligible for analysis. Most of the studies had a qualitative approach, and researchers collected data through interviews with a small number of individuals or focus groups. Details about preparation, analysis, and results of our systematic review are published [16]. We confirmed that quantitative research about KM in a healthcare settings is scarce, and there is a lack of an integrated self-administered questionnaire for health professionals who work in healthcare organizations.

Academics and practitioners from other scientific fields have developed appropriate questionnaires for KM [17]. Still, to our knowledge, no one has until now introduced a reliable quantitative tool that explores KM elements in healthcare organizations.

The purpose of this study is to develop and test a questionnaire to learn more about knowledge management in healthcare settings. We aim to create a tool that could explore attitudes, emotions, cognition, intention or behavior, and identify motivators of and barriers to employees about KM.

2. Methods

2.1. Questionnaire Design

Rattray and Jones [18] claimed that researchers who design a questionnaire should use various resources, such as discussions with experts, proposals of participants, and an extensive literature review to increase the face and content validity. Before creating this questionnaire, we conducted a systematic review of the literature [16]. This review identified six critical elements of KM in healthcare settings: perceptions of KM, synthesis, dissemination, collaboration, means of KM, and leadership. Furthermore, it detected several barriers, which restrict the implementation of knowledge management practices. These findings stimulated us to attempt the development of a questionnaire, which we named the Applied Knowledge Management Instrument or AKMI. The word "AKMI" is similar to the English word acme, which has a Greek origin and means the highest point or peak. We chose this name to stress that effective knowledge management could lead hospitals and other healthcare units to top performance.

2.2. Ethical Issues

The study protocol received approval by the scientific and the border committee of the General Hospital of Messinia, Greece. We composed a letter stating that the completion of the questionnaire is voluntary, and that we will protect the privacy of human subjects while collecting, analyzing, and reporting data by anonymity [19]. Furthermore, we clearly announced the purpose of the study, the significance of the contribution of each employee, and that the completion of the questionnaire will have a positive impact on the hospital and science in general [20]. A cover letter stated a brief definition of KM to clarify the term for those who were not familiar with it. In this way, we motivated potential participants to complete the questionnaire.

2.3. Research Tool

2.3.1. Selection of the Factors

We selected the following factors of knowledge management for healthcare settings for analysis: perceptions about KM, intrinsic motives, extrinsic motives, knowledge synthesis, dissemination, cooperation, leadership, culture, and barriers. The items of the factors consisted of closed-ended statements, and participants completed AKMI by reporting their level of agreement on a five-point Likert scale. The first statement, for example, is, "Each hospital should implement KM politics." There is only one open-ended question, which asks, "In your opinions, which are the three most important barriers of knowledge management," to identify KM obstacles. Furthermore, the questionnaire had questions for job satisfaction, self-efficacy, and state anxiety, and six items for demographics. These questions were the last to diminish the possibility of drop-outs [18].

2.3.2. Perceptions about Knowledge Management (KM)

The theory of reasoned action assumes that there is a relationship between attitudes and volitional behavior [21]. As a result, a positive attitude or perception towards KM could lead to action like knowledge creation or sharing. Chang et al. [22] claimed that better comprehension of KM improves employees' performance at hospitals. Another study revealed that a positive attitude for KM could give a competitive advantage and can increase innovation [23]. Another supposition is the existence or absence of a correlation between positive perceptions about KM and self-efficacy, as it appears in a sample of librarians in Israel [17]. This factor consists of five items.

2.3.3. Motives

Motives activate individuals to fulfill their needs [24]. If the reward from a specific action is endogenous (e.g., feeling of satisfaction), the motivation is intrinsic, and if it is exogenous (e.g., financial

compensation), the motive is extrinsic [25]. The exploration of the motivations that drive employees to knowledge creation and sharing is one of the main goals of our study. Two factors are needed to represent motives; one for the intrinsic features and one for the extrinsic characteristics. Each latent factor consists of four items.

At the intrinsic motives, the person draws satisfaction from other external rewards, like the challenge of completing a difficult task. It is hard but possible for managers to handle intrinsic motives [26]. Comprehension of human behavior could help managers. For instance, people seek purposes to fulfill their life, and a shared goal promotes collaborative relationships. On the contrary, the lack of use places a psychological burden on employees [27]. Intrinsic motives for participating in KM procedures could be the satisfaction of having and transmitting knowledge, and the joy of helping others [28].

The reinforcement theory suggests that individuals are motivated when their behavior is reinforced positively (with rewards) or negatively (with the reduction or removal of positive rewards) [29]. The theory has received some criticism, but tangible rewards are significant motivators for other methods as well [25]. Recorded extrinsic motives for KM are personal, professional, and financial rewards for participating in KM procedure, work safety and stability, and other ways of individual support. Effects of extrinsic and intrinsic motivation on employees' knowledge-sharing intentions were examined in Taiwan, using structural equation modeling. The sample was 172 employees of a big group of firms [30]. A comparison of these results with participants from a Greek public hospital could be rather interesting.

2.3.4. Knowledge Synthesis

Knowledge synthesis is a fundamental element of KM [31] and healthcare settings [14]. Results showed many ways of creating knowledge, such as interactions of colleagues [32], formal and informal meetings [33], and recorded evidence [34]. The synthesis will attempt to clarify which groups of employees are more involved in the process and whether it connects strongly with other factors like perceptions, culture [35], or leadership [36], in different environments besides hospitals.

2.3.5. Knowledge Sharing and Collaboration

Knowledge sharing through collaboration is fundamental for KM because it can be carried out by all employees, regardless of their ability to create knowledge. Next, we will examine whether this factor (using five items) relates to various motives. Furthermore, we will test if knowledge sharing correlates with personal and demographic characteristics [37]. The "openness" to cooperation will also be examined [38] with four items, as stated in the case that collaboration among different groups of health professionals increases the likelihood of innovation [39]. Pezeshki Rad et al. [40] designed a questionnaire for knowledge sharing at the Iranian Ministry of Agriculture that had some interesting questions, which we modified and adopted for this factor.

2.3.6. Leadership

Leaders have a significant impact on businesses and organizations. They are expected to ease access to information, encourage innovation, and empower employees to implement KM practices [41]. The way they act is fundamental to the success of knowledge sharing [42]. They should build a culture of knowledge [43], reinforce continuous learning, and create communication channels [22]. Leaders have the power to provide support and rewards [43]. Factor "leadership," which consists of three items, will be tested for correlations with culture, extrinsic motives, and self-efficacy, to clarify its impact on KM.

2.3.7. Culture

Knowledge culture represents the factor with the most items (nine items). Here, it is examined if a healthcare setting supports innovation, research, and cultivates a learning environment. Organizational

culture is a broad term that refers to ideologies, practices, norms, and social behaviors. It gives integration and differentiation opportunities [44]. Sibbald et al. [45] found that leadership and organizational culture are instrumental in supporting knowledge management procedures in hospitals. We will also examine the relationship between corporate culture and perceptions of employees about KM.

2.3.8. Barriers

Even if administrators and employees might have the best intentions to create and share knowledge, there are often obstacles complicating their efforts. Most studies exploring the subject have a qualitative orientation [46–48]. Likewise, we chose an open-ended question of AKMI to reveal more barriers to implementing KM in hospitals. Still, we also entered three items for the quantitative part of the scale.

2.4. Pilot Study

We initially developed a pilot questionnaire of 38 questions. Then, we asked the opinion of three experts from the Hospital. The first expert was a medical doctor, who was the manager of a public Health Center, and responsible for the continuous education of physicians who undertake their internship. The second expert was the administrative manager of a General Hospital, an expert in Hospital Administration. The third expert was a registered nurse with a Master's degree in special education [49]. After the discussions, the number of questions increased to 64.

The extensive questionnaire of the 64 questions was pilot tested in a sample of 31 employees (physicians, nurses, midwives, health visitors, and administrative staff) who work at two public health centers and a public Physical Medicine and Rehabilitation Center. The participants (24 females and 7 males) had a mean of 19.82 years of working experience (SD 7.99) and a mean age of 45.42 (SD 6.72) years.

The questionnaire was completed for a second time 15 days later by the same group of people. Test-retest was measured with the intraclass correlation coefficient (ICC, two-way mixed model on absolute agreement) [50] for all the questions except the demographics. The results of ICC are interpreted according to the scores as follows: <0.40 poor, 0.40–0.49 adequate, 0.60–0.74 good, 0.75–1.00 excellent [51]. The ICC of our study was excellent (ICC average measures: mean 0.904, min 0.717, max 1.000). For the questions answered by the Likert scale, we measured Cronbach's Alpha coefficient wıth mean value equals to 0.905 [52]. Figure 1 shows the dimensions of AKMI.

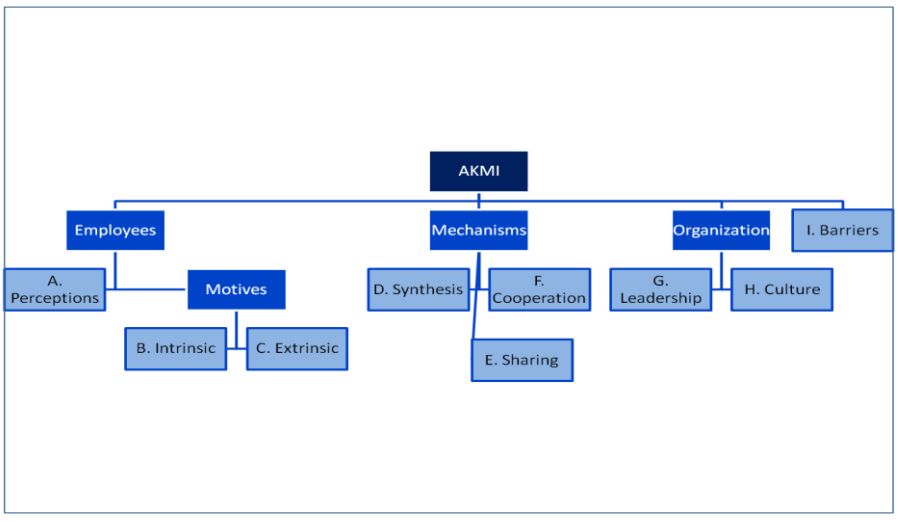

Figure 1. The architecture of Applied Knowledge Management Instrument (AKMI).

2.5. Data Analysis

Data were collected and entered on Microsoft Excel and analyzed with SPSS v22 (SPSS Inc, Chicago, IL, USA). Missing values were less than 3.2% for each item (overall missing values less than 4‰). We conducted Little's MCAR test, which indicated that values were missing completely at random. Therefore no entry was excluded from the analysis, and missing values were not replaced because sometimes imputation techniques for handling missing data result in biased estimates [53,54]. Reverse coding questions were recoded into different variables before further analysis.

To test whether data were appropriate for factor analysis, we measured the Kaiser–Meyer–Olkin (KMO) coefficient (KMO = 0.696). Furthermore, we carried out Barlett's test of sphericity, which showed a significant p-value <0.001. Both tests indicated that the dataset was suitable for factor analysis [55]. Furthermore, the sample size of the dataset was larger than 250, which is a prerequisite for obtaining reliable results [56].

3. Results

3.1. Study Population

This study took place from February to June of 2015 at General Hospital of Kalamata, which is a medium-sized public hospital with 300 beds, and the biggest (out of two) from a rural area of 200,000 inhabitants in Messinia, Greece. In 2015, the hospital had approximately 700 employees, of which 30% were males and 70% females. We asked 300 employees to participate in the study, and 261 employees agreed and completed the questionnaire (87% response rate). Even if there is no rule of thumb for the ideal sample size for testing a newly developed scale, a sample size of more than 200 people is acceptable [57].

Demographics of participants as regards gender, age, professional status, and working experience resembled the rest of the employees, who did not participate (Table 1). The completion time was 10–15 minutes.

Table 1. Demographic characteristics of the 261-employee sample.

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Gender					
Valid	Male	75	28.7	29.1	29.1
	Female	183	70.1	70.9	100
	Total	258	98.9	100	
Missing					
Total					
Professional status					
Valid	Physician	47	18	18	18
	Nurse	102	39.1	39.1	57.1
	Administrative staff	59	22.6	22.6	79.7
	Paramedics	21	8	8	87.7
	Midwives - Health visitors	7	2.7	2.7	90.4
	Other	25	9.6	9.6	100
	Total	261	100	100	
Educational status (in years of study)					
	9 years	6	2.3	2.3	2.3
	12 years	57	21.8	22.2	24.5
		107	98.9	100	
	16 years (technological orientation)	107	98.9		
Missing					
Total					
	N	**Min**	**Max**	**Mean**	**Std. Dev.**
Age	254	21	62	44.61	8.18
Overall Working experience	257	0.4	36	18.94	8.76
Working experience	256	0.4	36	14.17	9.18

3.2. Validity

Face validity is a measure for the suitability of the project. It concerns the appropriateness, sensibility, or relevance of a test and its items and evaluates how it appears to the people who undertake it. Even if face validity seems an ambiguous term, it is essential for the success of a test or scale [58]. Many participants reported that our questionnaire was exciting and comprehensive. Additionally, they realized how effective knowledge management is and stated that they could participate more in knowledge sharing in the future. Content validity is a characteristic associated with the scale's adequacy for the measurement of the concept under consideration. It can only be checked subjectively through its approval by connoisseurs [59]. Our questionnaire was a subject of extended discussions at the pilot phase with three experienced health professionals with various educational and professional backgrounds, to ensure content validity. Additionally, we performed a factor analysis to establish construct validity [60].

3.3. Exploratory Factor Analysis

We conducted factor analysis, with extract method Alpha factoring, which resulted in 19 components with an eigenvalue greater than 1.0 that explained 52.8% of the variance. Due to low scoring, we removed a group of questions regarding "facilities" and nine more items. Most of the single items we excluded were reverse coded, and that means that they confused the participants. Following principal component factoring and varimax rotation, we repeated the analysis with a forced nine-factor solution. This time, the solution explained 56.87% of the variance. Table 2 illustrates results from factor analysis.

The estimate for the internal consistency of the entire questionnaire (Cronbach's alpha) was 0.802. Each dimension had the following Cronbach's α: perceptions—0.724, intrinsic motivation—0.626, extrinsic motivation—0.739, knowledge synthesis—0.652, knowledge sharing—0.570, cooperation—0.567, leadership—0.717, culture—0.821, barriers—0.664. Median, interquartile range, and outliers of the results from the nine dimensions of AKMI are presented in Figure 2, and the final version of AKMI with preliminary results is shown in Table 3.

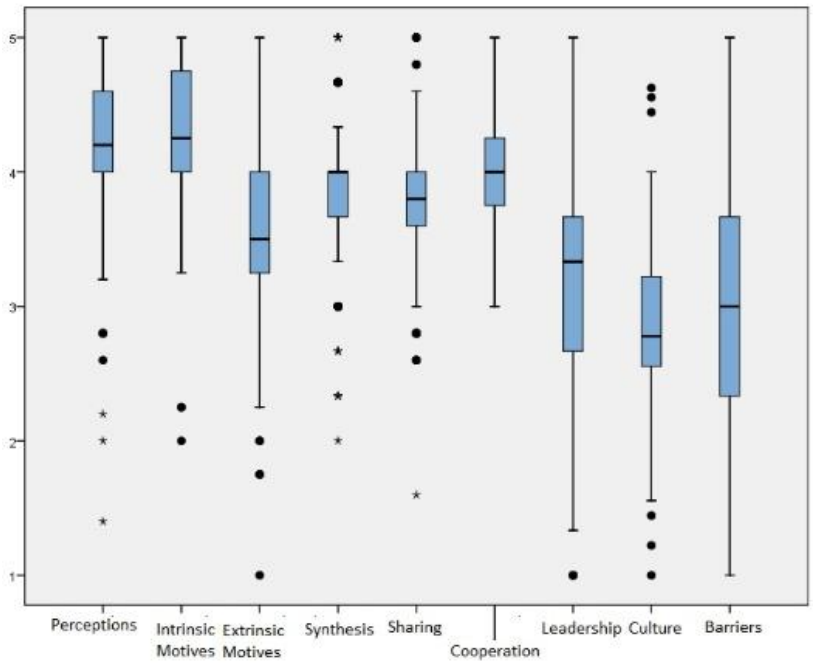

Figure 2. Boxplots of the nine dimensions.

Table 2. Exploratory factor analysis of the knowledge-management (KM) dimensions.

Items	Communalities	Loadings								
		1	2	3	4	5	6	7	8	9
Each hospital should implement KM politics										
KM is essential for the performance of the hospital.	0.772	0.854								
KM helps decrease errors.	0.830	0.900								
Knowledge acquisition helps the individual's autonomy	0.665	0.779								
Knowledge recording helps employees adapt when they are transferred to different departments of the hospital.	0.260	0.323								
I feel content when I share my knowledge with others.	0.453	0.272								
When I know something is useful for my colleagues, I inform them. It is a matter of principle.	0.579		0.668							
I could participate in a seminar because I like knowledge even if I would not receive credit or a certificate	0.575		0.675							
Knowledge acquisition gives me the power	0.433		0.531							
When I share my knowledge, my colleagues respect me more.	0.466		0.381							
When I share my knowledge, I bond with my colleagues.	0.703			0.790						
When I help my colleagues, they help me, respectively.	0.788			0.860						
I have higher chances of promotion where I possess knowledge.	0.600			0.736						
I create knowledge through observation of the working environment.	0.529			0.366						
Knowledge is created during group meetings.	0.433				0.438					
Knowledge is created during group seminars.	0.698				0.512					
Knowledge is shared during group meetings.	0.618				0.371					
Knowledge is shared using electronic means (websites, wikis, forums).	0.454					0.488				
I share knowledge with colleagues who are my friends.	0.453					0.488				
I share knowledge with colleagues from my department.	0.319					0.514				
I share knowledge with colleagues of other professional groups at the hospital.	0.453					0.544				
I often cooperate with my colleagues to face a new situation	0.714					0.200				
When I come across difficulties, I ask my colleagues.	0.359						0.411			
When I know the work of others, it improves my performance	0.497						0.487			
Cooperation when creating new knowledge reduces the anxiety of responsibility in the case of an error	0.319						0.301			
My supervisor provides the required knowledge to solve problems.	0.391						0.241			
My supervisor rewards people who share their knowledge.	0.686							0.762		
Leadership creates channels of communication that help knowledge transfer.	0.727							0.793		
At this hospital, there are KM strategies.	0.674							0.310		
In this hospital, personnel are encouraged to innovate if they have a new idea.	0.487								0.592	
This hospital supports research.	0.692								0.778	
This hospital is a knowledge creation agency.	0.668								0.764	
This cooperation strengthens the knowledge culture of my department.	0.589								0.726	
In this hospital, there are commonly shared files to inform employees.	0.572								0.275	
Leadership at this hospital has not understood the importance of KM (reverse coding).	0.484								0.594	
There is no knowledge culture in this hospital (reverse coding)	0.522								0.680	
Most colleagues share their knowledge freely.	0.458								0.634	
Hospitals' information system does not facilitate KM.	0.514								0.507	
I have no access to useful information for my work.	0.658									0.409
I do not know very well where to find useful information for my work.	0.725									0.727
										0.838

Table 3. The final version of the Applied Knowledge Management Instrument.

Item	Dimensions	Mean	Median	Factor's Mean	Cronbach Alpha
A.	**PERCEPTIONS**				
1	Each hospital should implement KM politics.	4.26	4.00		
2	KM is essential for the performance of the hospital.	4.30	4.00	4.19	0.724
3	KM helps decrease errors.	4.27	4.00		
5	Knowledge acquisition helps the individual's autonomy.	4.12	4.00		
6	Knowledge recording helps employees adapt when they are transferred to different departments of the hospital.	3.99	4.00		
B.	**INTRINSIC MOTIVATION**				
7	I feel content when I share my knowledge with others.	4.27	4.00		
8	When I know something is useful for my colleagues, I inform them. It is a matter of principle.	4.42	4.00	4.33	0.626
9	I could participate in a seminar because I like knowledge even if I would not receive credit or a certificate of participation.	4.29	4.00		
12	Knowledge acquisition gives me power.	4.35	4.00		
C.	**EXTRINSIC MOTIVATION**				
13	When I share my knowledge, my colleagues respect me more.	3.56	4.00		
14	When I share my knowledge, I bond with my colleagues.	3.64	4.00	3.55	0.739
15	When I help my colleagues, they help me, respectively.	3.59	4.00		
17	I have higher chances of promotion where I possess knowledge.	3.39	4.00		
D.	**SYNTHESIS**				
18	I create knowledge through observation of the working environment	3.91	4.00		
19	Knowledge is created during group meetings.	3.68	4.00	3.85	0.652
20	Knowledge is created during group seminars.	3.95	4.00		
E.	**SHARING**				
24	Knowledge is shared during group meetings.	3.65	4.00		
25	Knowledge is shared using electronic means (websites, wikis, forums).	3.96	4.00		
26	I share knowledge with colleagues who are my friends	3.44	4.00	3.74	0.570
27	I share knowledge with colleagues from my department.	3.91	4.00		
28	I share knowledge with colleagues of other professional groups at the hospital.	3.76	4.00		
F.	**COOPERATION**				
30	I often cooperate with my colleagues to face a new situation.	3.95	4.00		
31	When I come across difficulties, I ask my colleagues.	4.18	4.00		
33	When I know the work of the others, it improves my performance.	3.97	4.00	4.04	0.567
34	Cooperation when creating new knowledge reduces the anxiety of responsibility in case of an error.	4.05	4.00		
G.	**LEADERSHIP**				
35	My supervisor provides the required knowledge to solve problems.	3.52	4.00		
36	My supervisor rewards people who share their knowledge.	3.29	4.00	3.23	0.717
39	Leadership creates channels of communication that help knowledge transfer.	2.88	3.00		
H.	**CULTURE**				
37	Leadership at this hospital has not understood the importance of KM (reverse coding).	2.61	3.00		
38	At this hospital, there are KM strategies.	4.42	3.00		
40	In this hospital, personnel is encouraged to innovate if they have a new idea.	4.29	3.00		
41	This hospital supports research.	4.35	3.00	2.83	0.821
42	This hospital is a knowledge creation agency.	2.72	3.00		
43	This cooperation strengthens the knowledge culture of my department.	3.68	4.00		
44	There is no knowledge culture in this hospital (reverse coding).	2.95	3.00		
45	In this hospital, there are commonly shared files to inform employees.	2.71	3.00		
23	Most colleagues share their knowledge freely.	2.76	3.00		
I.	**BARRIERS**	2.61			
46	The hospitals' information system does not facilitate KM.	3.19	3.00		
52	I have no access to useful information for my work.	2.81	3.00	2.95	0.644
53	I do not know very well where to find useful information for my work.	2.84	3.00		

We further estimated the polychoric inter-correlations among the AKMI subscales and reported significant correlations between factors. Table 4 shows the estimated polychronic intercorrelations.

Table 4. Polychronic inter-correlations between factors.

Factors	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Perception (1)	1.000								
Intrinsic motives (2)	0.059	1.000							
Extrinsic motives (3)	0.110	1.054 ***	1.000						
Synthesis (4)	0.285 ***	0.230 **	0.359 ***	1.000					
Sharing (5)	0.201 *	0.421 **	0.283 **	0.469 ***	1.000				
Cooperation (6)	0.280 **	0.752 **	0.660 ***	0.526 ***	0.617 ***	1.000			
Leadership (7)	–0.041	0.252 *	0.098	–0.059	0.101	0.096	1.000		
Culture (8)	–0.015	0.271 **	0.202 *	0.018	0.151	0.056	0.949 ***	1.000	
Barrier (9)	0.000	–0.301 **	–0.210 *	–0.098	–0.223	–0.173 **	0.501 ***	–0.486 ***	1.000

Correlations are significant as follows: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.01$.

4. Discussion

This research aimed to develop a questionnaire to understand the concepts of knowledge management and to investigate the organizational factors that affect all aspects of the knowledge creation process within hospitals.

Knowledge management is related to sustainability, organizational learning, knowledge transfer, quality of care and safety, type of motivations, and barriers, all of which will affect the level of service.

4.1. Knowledge Management and Sustainability

The application of knowledge management can lead to a sustainable healthcare system, and leaders can achieve the goals of their organizations [61]. It is important to note that the knowledge management process can be significantly related to improvements in the quality of healthcare as well as the organizational-level of social and economic outcomes, as stated by Popa [10,62]. Doctors may process the information related to the healthcare industry, and based on their experience and knowledge, can improve the quality of the system and the management of their patients. Moreover, patients can increase their knowledge from various sources like the internet, social media, and other medical staff. In this way, patients can determine or change their behavior and thoughts and demand the best possible service. The optimal management of the knowledge process affects the quality of a system.

Social stainability issues in healthcare facilities is another aspect which is explained by [63,64]. An organization with collaboration can apply knowledge management to share information to make healthcare organizations sustainable.

4.2. Knowledge Management and Human Resources

Knowledge is also regarded as organizational culture, skills, reputation, intuition, and codified theory that influences human behavior and thoughts [65,66]. There is also a concern about the current and future status of human resources management in healthcare organizations [67] and the impact of human resources information systems technology. Each organization will need to use HR practices that will balance evidence from data, its objectives, individual factors, and Human Resources Information systems. Organizations are becoming increasingly aware of the importance of employees in gaining and maintaining competitive advantage.

The competitiveness of a healthcare organization depends on the effectiveness of its knowledge management [62], and the knowledge-sharing process helps sustainable engagement in healthcare.

4.3. Knowledge Management and Organisational Learning

With knowledge management, healthcare leaders can understand how collective learning enhances the quality and safety improvement of hospitals. Organizations can support the process of internal learning if the goal is the improvement of their services. External knowledge acquisition often occurs through processes involving people. Knowledge management can help to reduce errors. For example,

effective control is achieved using a clinical decision-support system. As a result, the potential reduction of medical errors can affect the improvement of healthcare delivery.

For example, research suggests that collective learning plays a role in improvement [68]. Specifically, cooperative learning is the process of gaining information which helps the capabilities in groups and organizations. Another process is collective learning, which has to do with the understanding and skills in groups and organizations [68,69]. Collective learning differs from individual learning because it requires individuals to analyze and interpret organizational experience [68].

The implementation of knowledge management can be thought of in two different ways [70,71]. The first is that there is a possibility that knowledge management to increase the autonomy of the medical staff by enhancing knowledge access. Knowledge sharing can lead to knowledge creation. On the other hand, controlling activities of the team can decrease collective intelligence. The excess of autonomy can encourage individuals to destabilize the organization, and there is a chance for them to act against the interests of the organization.

4.4. Knowledge Management and the Developed Questionnaire

Scientific interest in the various aspects of knowledge management can allow the connection of past results and the creation of knowledge. The findings and their implications should be addressed in the broadest context possible. Future research directions may also be highlighted. Perceptions of knowledge management were examined for another group of professionals, such as librarians in India [72] and other sectors, like construction and design companies in Spain [73]. Comparisons have been made between the perceptions of employees about knowledge management from small and large organizations in the United Kingdom [74]. Intrinsic and extrinsic motivations of KM were explored by researchers from various scientific fields [30,75]. There is still a debate in this field if external rewards can be considered as drivers for knowledge sharing, and our questionnaire aspires to clarify this issue. Knowledge creation, sharing, and cooperation are amongst the most researched topics in this area. However, in the healthcare sector, the focuses were mainly qualitatively analyzed [16], even if there are a small number of surveys, e.g., [37]. As regards leadership, studies have indicated individual styles of leadership to be significantly associated with the art of KM practices [76]. Zheng et al. [77] suggest that KM fully mediates the impact of organizational culture, and Leidner et al. [78] claim that organizational culture influences knowledge management initiatives. Based on these findings, we will subsequently create a model to determine the correlation structure of KM dimensions using a structural equation modeling procedure.

We think that self-efficacy plays an essential role in knowledge sharing. Until now, self-efficacy is mainly correlated with computer skills and knowledge-management systems [79] and less with occupational self-efficacy. With our dataset, we could check for significant connections between occupational self-efficacy and intentions to create or share knowledge.

The barriers of knowledge management procedure will be studied using the information we have collected with a closed and open-ended question. We asked health professionals to name the three most essential barriers according to their experience about the implementation of knowledge management in their organizations. The rationale of the task is to reveal existing barriers, especially in their working environment, and understand the correlations of barriers with the rest of the dimensions of the set-up questionnaire, e.g., leadership, and organizational culture.

The main advantage for the use of a specific knowledge-management instrument for healthcare units concerning a standard KM questionnaire is that the former takes into account the sui generis nature of the healthcare environment and the particular type of working relationships among health professionals. Additionally, the design of AKMI was done cautiously, with carefully examined methodological steps of an exhaustive literature review, pilot testing and retesting extended discussions with health professionals, and item reduction with factor analysis according to the main findings. The completion time was acceptable, and the dropouts were practically non-existent. Finally,

participants spontaneously expressed their content after completed the questionnaire by stating that "this was their first step to actively participating in the knowledge-management process."

In terms of limitations, there are some caveats about specific dimensions of the questionnaire due to a just fair Cronbach's alpha score. Furthermore, our study does not permit premature generalization of the results obtained.

5. Conclusions

In summary, this paper describes the process of development and validation of a questionnaire with nine dimensions of knowledge management in healthcare organizations, perceptions of knowledge management, intrinsic and extrinsic motives, knowledge creation and sharing, cooperation, leadership, culture, and barriers. The introduction with AKMI makes a novel contribution to the study of KM in the area of healthcare organizations, adopting a social orientation at which employees and managers are the protagonists for successful KM in contrast to systems and sophisticated structures. Thus, AKMI has theoretical and practical implications. Universities may use the scale to explore knowledge management as a social process, at which people are the drivers of knowledge, smoothing the transitions from academia to practice. Similarly, it is useful to managers who need to know how they could motivate their personnel to engage in knowledge creation and sharing in an unimpeded way, in a working environment where innovation is supported.

Hospitals, as part of their operations, need to use knowledge-management systems to facilitate their operations' sustainably. Learning is an essential process, which is related to knowledge management [80]. The knowledge-creation process can lead to a sustainable competitive advantage process. However, few studies have empirically investigated how individual characteristics and organizational work practices influence knowledge sharing [81]. The knowledge creation process is vital for sustainability [82], and social media have an impact on this process [83]. Knowledge management enablers such as organizational structure, information technology (IT), strategy, and culture can be essential factors for the sustainability process of any healthcare organization. Different categories of healthcare employees have their role within sustainable operations, and human resources managers are encouraged to recruit people with the right qualifications to apply knowledge management.

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