THE EFFECT OF KNOWLEDGE MANAGEMENT ON ORGANIZATIONAL PERFORMANCE: A STUDY IN TECHNOLOGY BASED COMPANIES TO ENHANCING THE QUALITY OF WORK

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ABSTRACT

To control the course of the business with innovations and competitive advantages, the knowledge management needs to be incorporated into the organizational strategy. While studies show the relationship between Knowledge Management (KM), success and organizational strategy, practice differs. The value of knowledge management is well known to organizations but the area of debate needs to be left and actions translated in results. This thesis aims to determine the effect on organizational efficiency of knowledge management activities by carrying out quantitative research using a survey questionnaire in technologies focused companies. The analysis was carried out using the empirical model of Wu and Che, in order to validate the hypotheses identified in the study.

Keywords: Knowledge, Knowledge Management, Organizational Performance, Technology-Based Companies

INTRODUCTION

In order to control the leadership of the company with innovations and competitive advantages, information management needs to be incorporated in the organizational strategy. For (Al-Hakim et al., 2013) knowledge is the most valuable asset of the organization, and consequently, the most difficult to manage. Knowledge management presents itself as a model with a set of techniques and tools that deal with management processes and physical and digital infrastructure that facilitate, favor and stimulate the human processes of creation, sharing and dissemination of individual and collective knowledge (Demir & Ahmet, 2019). For knowledge management to have significant impacts on the organization, it is necessary to integrate it into its strategy, which can cause a significant improvement in the organization's performance. (Abdulameer et al., 2014; Antony & Hamad, 2020). define performance as the achievement of the objectives established by the organization or the overcoming of these, being able to be evaluated by financial, market and / or innovation aspects. The study is divided into six sessions. The first session deals with the introduction of the subject. Followed by the second session, a systematic review is presented explaining the forms of research to survey existing works and subjects. The third section deals with the theoretical framework explaining the main concepts for understanding the research. The fourth session presents the methodological process used in the research to achieve the research objectives. Subsequently, the results and analyses are presented in the fifth session, as well as the final considerations in the sixth session. Finally, the bibliographic references used in this research are presented.

SYSTEMATIC REVIEW AND PRESENTATION OF RESEARCH-RELATED PAPERS

The systematic literature review (Zhang, Guo, Cheng, Sanz & Hamad, 2021) is a way to analyze and interpret research relevant to a given issue, thematic area or interest. One of the objectives of the systematic review is to identify the works they relate in order to find linearity between the constructs. The strategy of systematic literature review was defined in a general consultation on the databases, which aims to detect in a relevant way what was written about the researched subject, according to Table-1.

Table 1 **INFORMATION QUALITY ATTRIBUTES**		
S. No	**Descriptors**	**Data Base**
1	Knowledge management	WoS, Scopus, Google scholar
2	Organizational performance	Scopus, Google scholar, Scielo,
3	Knowledge management model and organizational performance	Scopus, Google scholar

Analysis and classification of results on 3 levels: Within the context, to be analysed, outside the context. For the research, the combination of the keywords "Knowledge Management" and "Organizational Performance" was used. The results obtained were used as a reference for the construction of the research work, with due analysis according to the proposed objectives.

THEORETICAL FRAMEWORK

In this section the theoretical support of the research is presented, which examines the value of knowledge in organizations, knowledge management, knowledge management practices, organizational performance and empirical models that relate knowledge management and organizational performance.

### The Value of Knowledge in Organizations and Knowledge Management

Knowledge is considered by (Ryan et al., 2012; Xue & Colin, 2017). as the only advantage to offer differentiation for sustainable competition, that is, companies must promote the creation of knowledge, best practices and the transfer of skills to the entire organization with the aim of improving business (HO, 2018; Thivagar, Hamad & Ahmed, 2020). recognizes that the intangible aspects that add value to products and services are all based on knowledge. Unlike material assets that depreciate as they are used, the knowledge asset is unlimited and grows when it is stimulated and used. Physical and material resources are no longer the main pillar for satisfactory organizational performance. The size of a company's industrial facilities and administrative buildings is no longer a reliable measure of its importance or industrial capacity, since what adds value, innovates and makes a difference is knowledge. Knowledge only becomes a corporate asset when it is accessible, managed and surrounded by the same care dedicated to obtaining value from other tangible assets. Management of knowledge has emerged as a significant area for information system practice and research. This field is founded upon the theoretical foundations of information economy, strategic strategy, corporate culture, corporate behavior, organizational structure, artificial intelligence, quality management and corporate performance assessment. (Abusweilem et al., 2019; HO & Odor, 2018), defines knowledge management as an interdisciplinary field covering areas such as information and communication technologies, information systems and change management in order to improve processes and organizational performance.

Knowledge Management Practices

According to (Fernandez & Sabherwal, 2001), there are nineteen knowledge management practices to assess how management influences the organizational scope, as shown in Table-2.

Table 2 KNOWLEDGE MANAGEMENT PRACTICES IN THE ORGANIZATIONAL CONTEXT	
SECI MODEL	**PRACTICE**
Socialization	Employee rotation in all areas.
	Campings to exchange ideas or storm of ideas.
	Cooperation project through the board.
	Use of mentors and apprentices to transfer knowledge.
Internalization	Observational learning.
	Learn by doing.
	On-the-job training.
	Face-to-face meetings.
Combination	Information repositories, best practices and lessons learned.
	Access to web-based data.
	Web pages (intranet and Internet).
	Data base.
Outsourcing	Capture and transfer of knowledge from experts.
	Chat groups / web based discussion groups.
	Decision support system.
	Grupware and other team collaboration tools.
	Models based on analogies and metaphors.
	Advice (skills, "yellow pages").
	Problem-solving system based on technologies such as case-based reasoning

Organizational performance: (Bashaer et al., 2016; Abusweilem, Mohammed, Abualous & ShadiHabis, 2019).   Define organizational performance as achieving or exceeding the objectives set by the organization, which can be assessed by financial, market and innovation aspects. The performance of an organization refers to the results achieved by it in a certain period, which are evaluated by means of quantifiable parameters called indicators (Hamad, Al-Obeidi, Enas & Al-Taiy, 2020) Seeking to improve performance management mechanisms, (Hladchenko, Myroslava 2015; Bashaer et al., 2016) developed the Balanced Scorecard (BSC) , a management system that aims to balance the definition of indicators and goals in different perspectives or dimensions, as shown in Figure 1.

3
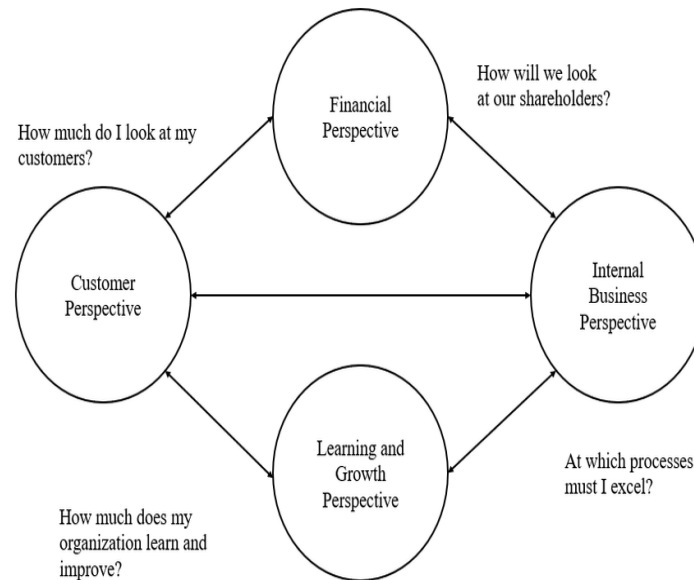
FIGURE 1
BSC PERSPECTIVES

Empirical Models of Knowledge Management and Organizational Performance+

In the systematic review carried out (Hladchenko & Myroslava, 2015), no studies were found that addressed the empirical application of models of knowledge management and organizational performance in Iraqi companies, as it is a topic rarely addressed in the country. Among the international studies obtained, the following models were identified as:

- Lee and Choi (2003)
- Fugate, Stank and Mentzer (2009)
- Zack, Mckeen and Singh (2009)
- Mills and Smith (2011)
- Wu and Chen (2014)

After evaluating the models, the research opted for the model by (Wu & Chen 2014; Hussinki & Henri, 2016). as it encompasses knowledge management in its entirety, in addition to assessing its relations with organizational performance. Another justification for selecting this model is that it is suitable for technology-based companies and business processes. The model by (Wu & Chen, 2014) is illustrated in Figure 2 .

4
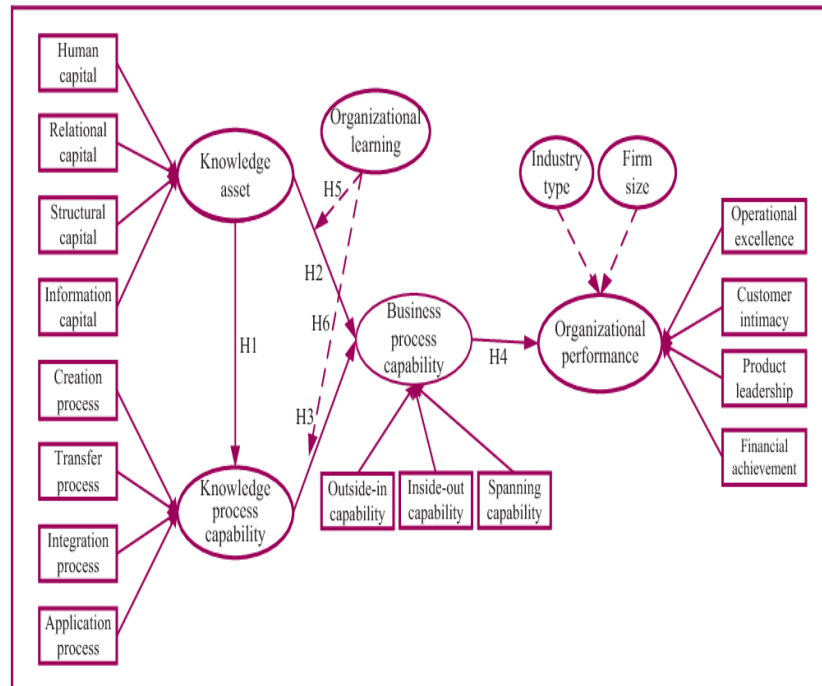
FIGURE 2
WU AND CHEN'S KNOWLEDGE MANAGEMENT AND ORGANIZATIONAL
PERFORMANCE MODEL

Using the model proposed by (Wu & Chen, 2014), the following hypotheses were formulated:

H1: More knowledge leads to more potential in the process of knowledge;
H2: More knowledge assets contribute to increased capital for business processes;
H3: improved capacity for market processes by increasing the tools of the information process;
H4: improved resources in business processes contribute to superior performance of organizations;
H5: Increased organizational learning contributes to a more moderating impact on information and business ability;
H6: Greater corporate learning has a more moderating impact on the relationship between expertise and business processes

Technology-Based Companies (TBC) and Their Characterizations

Technology-based companies are active participants in technological changes and are able to support a country's socio-economic development. The centre of TBC is the creation of paths that enable the transfer of technologies that are market oriented and have as a result the commercialization of innovative consumer goods based on scientific and technological knowledge. (Jabbouri et al., 2016; Wu, Chen, 2014) point out that TBCs, mainly Iraqi ones, focus on making significant technological efforts to manufacture "incremental" products from imitation, adaptation or reverse engineering. This type of manufacturing allows the construction of innovative products that are able to replace imported ones. Through these companies, it is possible to value technologies and procedures available in universities, institutions, research centres and, even, in companies, a reason that makes it fundamental in economic and social performance.

METHODOLOGICAL PROCEDURES

The research is descriptive and is predominantly characterized by a quantitative approach. Quantitative analysis is appropriate to measure opinions, attitudes and preferences as well as behaviors and descriptive research exposes characteristics of a certain population or a certain phenomenon.

Data collection was carried out by sending an online questionnaire (e- survey) to employees of technology-based companies, regardless of the position they held. The choice was made randomly, through contacts made via social networks, and it is not possible to measure the universe of the research. In total, 275 responses were obtained, 57 of which were discarded for presenting more than 10% of inconsistent responses. At the end, there are 212 valid answers for analysis.

For analysis, Structural Equation Modelling was used, using the Partial Least Squares (PLS) approach. The PLS approach offers an alternative to the traditional approach based on the covariance structure, CB-SEM (Covariance-based Structural Equation Modeling techniques). To check the quality of the adjustments, R2 was used to compare the indices with the qualitative nominal variables the Mann-Whitney and Kruskal Wallis test was used and to compare the indices with the quantitative and qualitative ordinal variables the Spearman Correlation was used (Awaja, 2018).

RESULTS

No value was found beyond the range of the respective variable in the study of outliers (which are observations that show a different response pattern from others). Based on the Mahalanobis measurement, Multivariate outliers were diagnosed. Zwain et al (2012); (Kasuya & Eiiti, 2001). verifies every observation's location in a sequence and ultimately performs a chi-square test relative to the centre of all observations. Multivariate outliers were considered for individuals with a measuring significance of less than 0.001. Seven atypical persons were found based on this approach. The correlations of the variables have been analyzed pair by pair for verification of the linearity of the results, since a substantial coefficient of correlation of 5 percent indicates linearity. 944 of 946 important relations were found at 5%, representing about 99.78% of potential associations, via the Spearman correlation matrix.

The constructs " Knowledge Assets", "Knowledge Process Capacity", "Negotiation Process Capacity" and "Organizational Performance," which were not explicitly created by items (questions), but by other latent variables, were considered as the second-order constructs (indicators). The 'Two-Step' approach has been used to resolve this aspect of the measuring structure. This is achieved using an Exploratory Factor Analysis (AFE) with the process of extracting the major components and the promax rotation, to determine the values for the first order of latent variables first. The purpose of the Exploratory Factor Analysis for first order buildings is to check if any item (question) of the buildings that does not help form indexes should not be excluded. Awaja, et al (2018) propose that items with factor loads below 0.50 should be omitted from constructs because they do not make a significant contribution to the creation of a latent variable, thus impairing the range and the consistency of the indicators that are generated in order to reflect the definition of interest in the basic assumptions of validity.

Dimensionality, reliability and convergent validity were tested to evaluate the consistency and validity of the first order structures. The criterion introduced by (Demir et al., 2019; Awaja et al., 2018) was applied to check the convergent validity, which shows that the convergent validity is greater than 50 percent or 40 percent when the mean extracted variance (AVE) is in the case of exploratory testing.

Cronbach Alpha and Composite Reliability have been used to calculate reliability. Tenenhaus et al, as described. In order to indicate the reliability of constructs, Cronbach's alpha (AC) and Composite Reliability (CC) metrics should surpass the 0.70 level and are also approved at exploratory research values above 0.60.

The Kareem, et al., (2019); (Demir & Ahmet, 2019). criterion was used to regulate the dimensionality of the buildings, which gives the number of variables to keep in an examination of the exploratory element, i.e. the quantity of the dimensions of the building. The adequacy of the sample was calculated with the KMO indicator, which shows the share of data variance that can be considered common to all variables. The sample is more suitable for the use of factor analysis and the closer it to 1.0 (unit) ranges from 0.0 to 1.0. Exploratory factor analysis can be used for a set of variables where the KMO reaches 0.50.

The Table 3 shows the results for the validity and quality of the constructs. Therefore, it can be highlighted that:

•	All constructs presented convergent validation (AVE> 0.40);

•	All constructs presented Cronbach's alpha (AC) and composite reliability (CC) above 0.60. In other words, they all presented the required levels of reliability;

•	In all constructs, the adjustment of the Exploratory Factor Analysis was adequate, since all KMOs were greater than or equal to 0.50.

Table 3 RELIABILITY, CONVERGENT VALIDITY AND DIMENSIONALITY (DIM) OF THE SECOND ORDER CONSTRUCTS INDICATORS.							
Constructs		Items	AVE	A.C	CC	KMO	Dim
Knowledge Assets	Human capital	2	0.85	0.8	0.9	0.5	1
	Relational Capital	3	0.78	0.9	0.9	0.73	1
	Structural Capital	3	0.7	0.8	0.8	0.67	1
	Informational Capital	3	0.8	0.9	0.9	0.72	1
Knowledge Process Capacity	Creation process	3	0.68	0.8	0.8	0.61	1
	Transfer Process	3	0.83	0.9	0.9	0.74	1
	Integration Process	3	0.81	0.9	0.9	0.72	1
	Application Process	3	0.75	0.8	0.8	0.7	1
Knowledge Process Capacity	Outside-in capacity	4	0.73	0.9	0.9	0.82	1
	Inside-out capability	4	0.68	0.8	0.8	0.8	1
	Capability	4	0.74	0.9	0.9	0.83	1
Business Process Capability	Operational Excellence	2	0.87	0.9	0.9	0.5	1
	Customer Intimacy	2	0.93	0.9	0.9	0.5	1
	Product Leadership	2	0.83	0.8	0.8	0.5	1
	Financial Realization	2	0.89	0.9	0.9	0.5	1
Source: Research data.							

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Structural Equation Modelling

Although first-order constructs are reflective, second-order constructs are formative. Thus, first order constructs are the causes of their respective second order constructs, while items (questions) are reflections of their respective first order constructs.

The validation of a formative measurement model requires different approaches to the reflective model. The conventional assessment of validity and reliability of constructs should not be applied to formative models. Therefore, to assess the formative measurement model, it was verified whether the weights were significant or greater than 0.20 and whether the factorial loads were greater than 0.6.

Once there are insignificant weights and low factor loads, there is no empirical support to maintain the indicator in the model. It was also assessed whether the Variance Inflation Factor (VIF) was greater than 5, thus avoiding multi-collinearity problems. It was also identified that the correlations between the constructs were less than 0.85, in order to indicate that each construct was sufficiently different from each other.

The Table 4 shows the factor loadings, weights with their respective confidence intervals and p-values and the variance inflation factor (VIF).

Table 4 MEASUREMENT MODEL						
Constructs		**Models**				
		CF	**Weight**	**CI - 95%**	**P-value**	**VIF**
Knowledge Assets	Human capital	0.8	0.26	[0.13; 0.40]	0	1.9
	Relational Capital	0.81	0.29	[0.12; 0.44]	0	1.8
	Structural Capital	0.85	0.26	[0.08; 0.46]	0.005	2.3
	Informational Capital	0.85	0.4	[0.24; 0.54]	0	1.8
Knowledge Process Capacity	Creation process	0.83	0.22	[0.03; 0.38]	0.013	2.3
	Transfer Process	0.83	0.22	[0.03; 0.44]	0.036	2.6
	Integration Process	0.89	0.26	[0.00; 0.49]	0.035	3
	Application Process	0.9	0.45	[0.26; 0.64]	0	2.1
Knowledge Process Capacity	Outside-in capacity	0.87	0.37	[0.04; 0.60]	0.018	2.3
	Inside-out capability	0.91	0.33	[0.09; 0.56]	0.006	2.8
	Capability	0.89	0.43	[0.26; 0.68]	0	2.1
Business Process Capability	Operational Excellence	0.94	0.52	[0.31; 0.77]	0	2.5
	Customer Intimacy	0.84	0.17	[-0.05; 0.36]	0.012	2.7
	Product Leadership	0.86	0.24	[-0.01; 0.47]	0.049	2.7
	Financial Realization	0.76	0.21	[0.03; 0.36]	0.016	1.8

The PLS approach was used to calculate the model and the structural model. The PLS approach is an alternative to traditional approach based on covariance, and structural equation models are common. In considering measurement sizes, sample size and waste distributions, the PLS method has been referred to as a smooth modelling technique with limited demand.

The Product Approach Indicator has been used to verify the moderating impact of organizational learning on the connection between the information asset and business process capabilities and the knowledge process ability. The Product Approach of the indicator produces a new latent product of the exogenous variable and the moderating effect, a new variable in the structural model. A variable that influences the intensity or direction of the relation between a separate variable and a dependent variable causes a moderating effect. R2

was used to verify the consistency of the adaptation. The R2 shows how well the independent structures describe the dependencies in a scale between 0 and 100 the closer the 100 percent the better.

According to the results presented in Table 5 have that:

- Knowledge assets had substantial effect on the knowledge process potential (p-value > 0.000) and positive impact ($\beta = 0.716$ [0.65; 0.80]).
- The impact of information assets on the business process' capacity was large (p-value = 0.000) and optimistic ($\beta = 0.359$ [0.21; 0.52]). The greater the information assets, the greater the potential of the business process;
- The impact on the information process capacity of the Business process was important (p-value = 0,000) and optimistic ($\beta = 0,550$ [0,38; 0,68]). The more the capability of the information process is, the more the market process appears to be capable of being;
- The impact of the business process capability on organizational efficiency was important (p-value = 0.000) and positive ($\beta = 0.739$ [0.66; 0.82]). The higher the capability of the business process, the higher the organizational performance;

Table 5
STRUCTURAL MODEL

Dependents	Independent	B	CI - 95% [1]	E (β) [2]	P-value	R^2
Proc. Capacity of knowledge	Knowledge Assets	0.716	[0.65; 0.80]	0.048	0	51.30%
Business process capability	Knowledge Assets	0.359	[0.21; 0.52]	0.069	0	72.40%
	Proc. Capacity of knowledge	0.55	[0.38; 0.68]	0.066	0	
	Effect Mod. 1: Known assets x Cap. PN	-0.1	[-0.28; 0.08]	0.071	0.146	
	Effect Mod. 2: Cap. PN x Cap. PN	0.111	[-0.08; 0.28]	0.072	0.125	
Organizational Performance	Business process capability	0.744	[0.66; 0.82]	0.046	0	55.40%

Analysing the results obtained with the research, it can be seen that hypotheses H1, H2, H3 and H4 were confirmed and hypotheses H5 and H6 were not confirmed

Table 6
INFORMATION QUALITY ATTRIBUTES

HYPOTHESES	RESULT
• H_1: More knowledge leads to more potential in the process of knowledge;	Confirmed
• H_2: More knowledge assets contribute to increased capital for business processes;	Confirmed
• H_3: improved capacity for market processes by increasing the tools of the information process;	Confirmed
• H_4: improved resources in business processes contribute to superior performance of organizations;	Confirmed
• H_5: Increased organizational learning contributes to a more moderating impact on information and business ability;	Not confirmed
• H_6: Greater corporate learning has a more moderating impact on the relationship between expertise and business processes	Not confirmed

FINAL CONSIDERATIONS

The work aimed to analyze the impact of knowledge management practices on organizational performance, through the knowledge management and organizational performance model of (Wu & Chen, 2014), using technology-based companies as a research base.

To achieve the proposed objective, the following strategic objectives were established:

- Draw a systematic literature review based on knowledge management models and organizational performance in a database with pre-established descriptions;
- Test and validate the hypotheses of the Wu and Chen (2014) model in Iraqi technology-based companies;

The choice for technology-based companies was due to the particularities of this type of organization. In addition to the fact that these companies are mostly composed of university students, recent graduates or researchers in a certain area, they are great considerable sources of technology.

It can be emphasized that both the general objective and the specific objectives were achieved by this research. This can be seen because:

- A systematic review was carried out in which 42 models of knowledge management and organizational performance were found, among which 5 models were selected because they are more robust and with greater adherence to the objectives set;
- Within the 5 models evaluated, the research opted for the model by (Wu & Chen, 2014) as it encompasses knowledge management in its entirety, in addition to assessing its relations with organizational performance. Another justification for selecting this model is that it is suitable for technology-based companies and business processes;
- The hypotheses raised in the model by (Wu & Chen, 2014) were validated in the context of Iraqi technology-based companies.
- Regarding the hypotheses defined in the research, the following results were achieved:
- Knowledge assets had substantial effect on the knowledge process potential (p-value > 0.000) and positive impact ($\beta = 0.716$ [0.65; 0.80]). The higher the information properties, the greater the potential of the knowledge process;
- The impact of information assets on the business process' capacity was large (p-value = 0.000) and optimistic ($\beta = 0.359$[0.21; 0.52]). The greater the information assets, the greater the potential of the business process;
- The impact on the information process capacity of the Business process was important (p-value = 0,000) and optimistic ($\beta = 0,550$ [0,38; 0,68]). The more the capability of the information process is, the more the market process appears to be capable of being;
- The impact of the business process capability on organizational efficiency was important (p-value = 0.000) and positive ($\beta = 0.739$[0.66; 0.82]). The higher the business process capability, the greater the organisation's performance;

It is noted that among the constructs, the one with the greatest positive influence (of 74.3%) on organizational performance is the business process, but it is clear that all constructs have a positive influence on organizational performance.

The research contributed to spread the concepts of knowledge management and organizational performance within technology-based organizations in order to point out that, if knowledge management practices are well defined and worked on, they can positively impact organizational performance.

The proposed study was limited to research only Iraqi technology-based companies. In addition, due to the form of data collection, it is not possible to identify the research universe. Thus, a suggestion for future research would be to carry out the same research in other segments such as industry or services nationwide, or companies in a given state of the federation.

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