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The role of intellectual capital as a mediating variable in the influential relationship between knowledge management and competitive superiority: A case study of operating banks in Annaba, Algeria

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***Abstract*---**This study aims at identifying the role of intellectual capital in mediating the relationship between knowledge management and competitive superiority in the Algerian banks. The sample of this study is composed of 340 individuals from commercial banks operating in Annaba, using a questionnaire as the primary data collection tool which includes 52 items. The hypotheses of the study are tested based on Path Analysis and the structural equation model for mediation analysis, with SPSS V26 and AMOS V25. The research ends with a series of findings and recommendations, mainly the lack of a direct impact of knowledge management on achieving competitive superiority. However, there is a positive indirect impact of knowledge management on achieving competitive superiority when intellectual capital is present as an intermediate variable. The study recommends paying great attention to the development and preservation of intellectual capital. Furthermore, plans and strategies for achieving competitive superiority should focus on the quality and continuous improvement of services provided and the use of information and communication technology as a pillar of knowledge management.

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1. Introduction

Knowledge application is the ultimate goal of knowledge management (KM). Simply acquiring, storing and sharing knowledge is not enough; what is important is transforming this knowledge into effective use. Competing by possessing human capabilities; emphasizing intellectual capital (IC) has become incomparable to other production elements. Given the distinct importance of knowledge, organizations have been motivated to invest in this crucial resource, particularly the knowledge stored in the minds of employees. They strive to transfer this knowledge through various mechanisms, transforming it into explicit knowledge embodied in the organization's manuals, procedures and policies. Then, this knowledge is used to produce products and services that provide the organization with distinction and competitive edge, meet customer desires, enhance the organization's performance and achieve its desired objectives.

Considering that banks are the backbone of modern economies, their importance is emphasized through their role in mobilizing savings and converting them into financial resources directed towards various sectors in the form of loans and investments. Due to the rapid changes and developments in the field of information and communication technology (ICT), the shift from a linear economy to a knowledge economy and the globalization of financial and banking markets, Algerian banks have faced a significant challenge, primarily in the form of intense competition from global banks with high service levels. This competition has led to a substantial market share being captured by these international banks. Additionally, the phenomenon of international market integration has increased the number of foreign bank branches and their market share.

In light of these developments in banks, Algerian banks are required to change and adjust their management methods to ensure their survival. Foremost among these requirements is the need to possess a sustainable competitive advantage, improve bank performance and activate their role in line with the surrounding circumstances. Possessing knowledge and the ability to effectively use it are fundamental pillars in the strategic management of banks. Banks are known for their knowledge-intensive nature across all activities, tasks and services, unlike other production institutions. As a result, banks must diversify and improve the services offered to attract the largest number of customers within the financial market. Hence, the research problem of this study is formulated in the following main question:

What is the role of Intellectual capital as a mediating variable between Knowledge management and achieving Competitive superiority in a sample of banks operating in Annaba, Algeria?

1. Literature Review

1.1. Concept of Knowledge Management :

Many researchers and authors with different perspectives have addressed the definitions of KM based on their field of expertise and intellectual schools. However, they have not agreed on a single definition. In his book "The New Wealth of Organizations" (1997), Thomas Stewart wrote that KM has become more important to organizations than financial resources, market position, technology, or any other company assets (Michel.J, 2002, p. 139). Meanwhile; (Putri, 2020, p. 200) views KM as a combination of data and information that can be integrated with a person's opinions, skills and experience during the decision-making process.

Alternatively, it is the organization's ability to generate new knowledge, disseminate it throughout the organization, and make it an integral part of its products, services and systems (Nonaka.I & Takeuchi.H, 1995, p. 2).
Pentland (1995) views KM as a continuous and interactive process. He defines it as a continuous set of important processes and stages embedded in the social and material structure of the organization, which can be applied and used in the best way to achieve the organization's goals (Ndbari, 2021, p. 540).
According to Wiig (2003), KM is the planning, organizing, controlling, coordinating and synthesizing of knowledge and assets related to IC, as well as the processes, capabilities and personal and organizational potentials to achieve the production of a competitive advantage (Wiig, 1993, p. 20).
Moreover, Costello and Donnellan (2011) consider KM the primary resource for creating Competitive superiority and generating value within an organization. Accordingly, Grant (1996) emphasized that KM is a valuable input in the production process and the primary source of value, as the latter is created through customer satisfaction with the organization. As knowledge is regarded as an intangible resource that is valuable, rare, unique and irreplaceable by other sources (Barney, 1991; Suwannarat, 2016), it can be a source of sustainable competitive advantage (Panissara & all, 2022, p. 4).
Alavi and Leidner (2001) define KM as a specific, systematic and organized process for acquiring, organizing and transferring explicit and implicit knowledge to employees so that they can use it to achieve greater efficiency, effectiveness and productivity in work (Bahloul, 2006, p. 18).
Therefore, KM can be defined as the organized management process of intellectual and knowledge assets that enable organizations to acquire, generate, organize and distribute important information, knowledge and experiences with the aim of creating added value and gaining a sustainable competitive advantage. Thus, ensuring the organization's leadership and superiority over competitors.

1.2. Knowledge Management Process KMP:

Knowledge management process is the heart of KM. This process is crucial in modern and successful organizations which look at knowledge as a major factor in competitiveness. KM has been seen as a fast response to weaknesses and threats that affect the way of organizations' business (Wageeh, 2014, p. 76). A

model for the KM process, which includes five main stages, is illustrated by (Wiig, 1993, p. 55) as follows:

1) **Knowledge Creation:** Indicates the organization's ability to identify information needs in a scientific manner;
2) **Knowledge Acquisition:** The organization's ability to acquire, store and keep knowledge in order to use it;
3) **Knowledge Organization:** The organization's ability to classify and convert knowledge to useful written materials (knowledge base), using modern technological methods;
4) **Knowledge Distribution:** The organization's ability to spread knowledge to the level of administrative organization and every individual within each level of an administrative unit, whether by e-mail, meetings, training courses or other.
5) **Use of Knowledge:** The organization's ability to benefit from knowledge and its circulation among all employees to increase functional skills and creative abilities, which lead to enhanced quality of service provided by the organization to its customers.

KMP facilitates knowledge sharing and establishes organizational learning as a continuous process within the organization. Researchers have argued in what processes KM should include; some classify them into four processes, while others expand them to include more. According to (Ndbari, 2021) KM involves three processes; Discovering knowledge, sharing and using. Burk (1999) described four stages; innovation, organization, sharing, using and reusing. Mertins et al. (2001) classified KMP into five stages; diagnosing, identifying, generating, Discovering**,** storing and applying knowledge. Additionally, KMP is formulated into four stages; generating and acquiring, organizing and storing documenting, and distributing and Utilizing knowledge (Alavi & Leidner, 2021, p. 115).

Accordingly, KMP differs from one organization to another and from one functional level to the other depending on the approaches to studying knowledge. Also, they vary in number, order and naming conventions. KMP is interrelated with each stage depending on the previous one and supporting the following one. Generally, KMP can be carried out in four or five basic stages in organizations, as they are the most commonly agreed-upon stages by the majority of researchers. This study will rely on the four fundamental KMP as dimensions of the independent variable; knowledge creation, Organizing and storing knowledge, and distributing and use knowledge.

1.3. Concept of Intellectual Capital:

IC consists of unspecified elements, as it primarily involves concepts with numerous and various meanings such as ability, skill, mental strength, creativity and learning. These concepts vary with changes in work and activity fields, as well as with the nature of organizations to which individuals possessing these traits belong. Among some of the concepts related to IC, which have been examined from different angles, are:

- The approach to defining IC based on its components and how it is measured;

- The approach to defining IC based on the objectives it aims to achieve, such as creating added value, achieving CA, increasing productivity and more; and
- The approach centered on the strong relationships between IC and other modern concepts, such as knowledge and information technology.

Thomas A. Stewart, in his book titled "Intellectual Capital," suggests that it is the knowledge, information, intellectual property rights and expertise that can be applied to produce and create wealth and enhance the organization's competitive skills (Bontis.N, 1998, p. 42). Edvinsson and Malone define IC as knowledge that can be converted into value. It represents the sum of human and structural capital, which includes expertise, organizational technology, customer relationships and professional skills that provide the organization with a competitive advantage in the market (Miroshnychenko.O, 2013, p. 33).

Table 1. Definitions of IC According to Some Researchers.

Researchers	Year	Definition of IC
Hall	1992	Intellectual capital, which is directly associated with creating a competitive advantage, is the driving force that converts resources into value-added tangible assets.
Stewart	1997	Intellectual capital, which is directly associated with creating a competitive advantage, is the driving force that converts resources into value-added tangible assets.
Wiig	1997	Organisations consist of financial capital and everything else. What is meant by "everything else" is intellectual capital? Everything else; It consists of knowledge, learning, production, creation and relationships. It focuses on renewing and maximising the value of the intellectual assets of the organisation
Nahapiet and Ghoshal	1998	It is the ability to collectively create knowledge, source of knowledge and act based on knowledge. Also, intellectual capital is a social entity and continues its development through social relations.
Ulrich	1998	Intellectual capital, which is vital to the success of the organisation, is the only significant asset that grows, unlike all other declining assets
Bukh et all.	2001	Knowledge, which is the essential raw material of the economy and also the result, is the primary substance of intellectual capital. Furthermore, for this reason, intellectual capital consists of knowledge, experience and intellectual property
Tseng and Goo	2005	It is a comprehensive whole that includes assets/values that cannot be measured directly in the organisation.
Tan et al.	2007	Intellectual capital, which is usually evaluated by researchers on three dimensions: human capital, customer capital, and structural capital, also takes into account the strategic alliance capital dimension, which is the fourth dimension according to one definition
Chahal and Bakshi	2015	IC is considered a fundamental and vital resource for organizations because it creates Compétitive superiority
Kianto et al.	2017	IC refers to all abstract resources, information and knowledge that organizations use to create and generate

Researchers	Year	Definition of IC
		value.
Dumay and Guthrie	2019	They are assets that are not recorded on the balance sheet, have little or no physical assets, but contribute to the financial value of the organisation.

Source: Retrieved from (AKSAKAL, 2020)

Accordingly, some researchers emphasize that the components of IC are knowledge, information, expertise and intellectual property rights. Whereas others concentrate on activities related to IC particularly in creating value and enhancing competitiveness. Additionally, IC is comprising knowledgeable workers who possess unique and specialized capabilities. These individuals are crucial for organizations to improve their competitive position and achieve high performance levels.

Therefore, IC represents abstract intellectual assets, consisting of knowledge, skills and expertise (implicit knowledge) possessed by employees, which can be transformed into high and explicit value. IC is divided into three basic components; human capital, structural capital and relational capital. These capabilities enable the organization to expand its market share, enhance its competitive position and achieve high levels of performance.

1.4. Concept of Competitive Superiority:

The concept of Competitive Superiority gained prominence through the writings of Tom Peters and Robert Waterman in their book “In Search of Excellence” (1982). They view organizational pursuit of advantage as crucial, defining it as an organization’s reliance on a flexible organizational approach that focuses on listening to customers and providing them with added value, supported by investment in its IC. Michael Porter defines advantage as a unique position achieved by an organization that helps attract customers, is difficult to imitate and is achieved through delivering superior and exceptional value by integrating elements of quality, price and service (Porter.M, 1993, p. 48). Competitive Superiority is positioning advantage in the market, based on providing advanced value to customers or achieving relatively lower costs, with high market share and profitability (George S & Wensley, 1988, p. 2).

Furthermore, Competitive Superiority is the organization’s ability to deliver products and services that provide added value to customers beyond what competitors can offer, continuously and over the long term, while achieving higher and sustainable profits compared to competitors (Hitt, Black, & Porter, 2012, p. 83).

Generally, researchers use the concepts of Competitive Superiority and competitive advantage interchangeably to denote relative superiority in skills and resources. However, it can be said that Competitive Superiority represents the end goal that organizations strive to achieve by adopting methods that sustain competitive advantage. Thus, the relationship between Competitive Superiority and competitive advantage represents the goal and the means, respectively. While Competitive Superiority is the goal of the organization, competitive advantage is

the means to achieve it, represented by its dimensions (George S & Wensley, 1988, p. 2).

Therefore, superiority is a holistic concept that cannot be fragmented, i.e., an organization cannot excel in one area without the others. An organization must achieve superiority across all its domains—financial, marketing, technological, etc. Competitive Superiority represents the final stage in the quest for sustainable competitive advantage, marking the organization's attainment of market leadership over the long term, achieving higher returns on investment and consistently maintaining superiority.

Consequently, Competitive Superiority can be defined as achieving sustainable superiority for the organization, leading to long-term growth, continuity, success and profitability. It creates value that customers recognize and surpasses competitors in one or more of the following dimensions; quality, flexibility, innovation, speed of delivery and cost reduction.

The dimensions of Competitive Superiority refer to the characteristics that an organization selects and focuses on when delivering products and meeting market demands. Through one or more of these dimensions, organizations aim to achieve Competitive Superiority, sustain themselves in the business environment and create a high level of performance. Researchers and authors have identified four fundamental dimensions that help an organization build and maintain competitive advantage; efficiency, quality, innovation and customer responsiveness (Hill, Jones, & Hilling, 2015, p. 94).

Evans and Hicks (1993) identified dimensions such as cost, quality, flexibility, innovation, customer retention and delivery. Additionally, Best, Slak, and Grant (1997, 2002) expanded on these dimensions to include growth, alliances, ease of use, supplier collaboration, customer satisfaction and design. These dimensions vary according to the researchers' viewpoints and depending on each organization. Thus, the current study will focus and adopt these dimensions as they are widely recognized and agreed upon by researchers. In addition, these dimensions align with the practices observed in the studied organizations—cost, flexibility, quality, timeliness and fast delivery.

2. The Conceptual model of the research:

The study adopts the mediation model, which consists of three variables; the independent variable, the mediating variable and the dependent variable. The mediating variable is used to test the interactive relationship that answers the questions of when and for whom the independent variable affects the dependent variable. This influence can be either strong or weak, as the mediating variable modifies the strength and direction of the causal relationship between the independent and dependent variables. The following figure illustrates the study's framework.

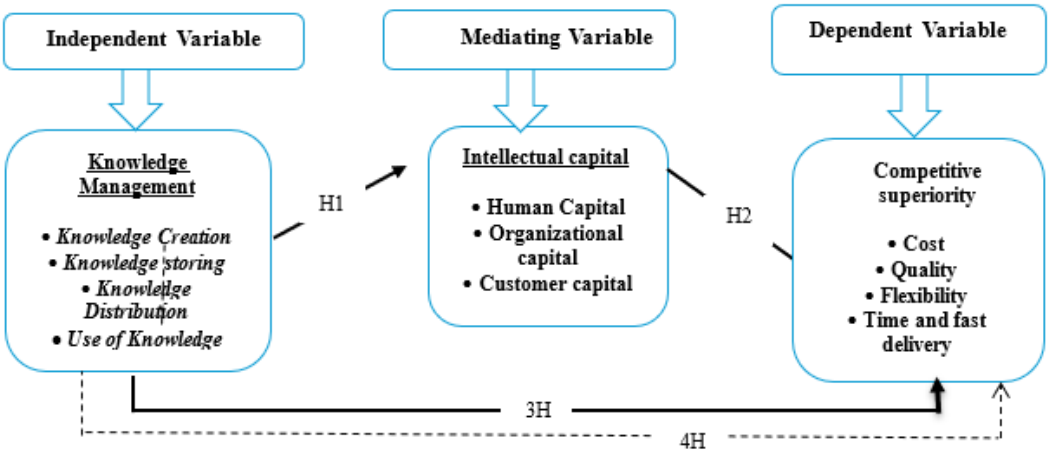

Figure 1. Conceptual model of the research

This study aims to test the mediating role of Intellectual capital between Knowledge management and Competitive superiority, and to examine the relational connections among the study variables: Knowledge management, Competitive superiority and Intellectual capital. This study proposed four main hypotheses:

H_1: There is a direct positive impact of Knowledge management process on Intellectual capital in the studied banks.
H_2: There is a direct positive impact of Intellectual capital on achieving Competitive superiority in the studied banks.
H_3: There is a positive impact of Knowledge management process on achieving Competitive superiority in the studied banks.
H_4: There is an indirect positive effect of Knowledge management process on achieving Competitive superiority through Intellectual capital as a mediating variable in the studied banks.

To achieve the study objectives, a key tool was applied, which was represented by the questionnaire. The data collected through the questionnaire were analyzed and the study hypotheses were tested using AMOS V25 software. The study questionnaire consisted of two main sections:

- **The First Section:** Concerns the personal and professional information of the participants.
- **The Second Section:** Includes three dimensions related to the study variables as follows:

Table 2. Sections of the Questionnaire's Axes and Dimensions

Sections	Axis	Minor Variables	Statements
Section One	-	Personal Data	05
Section Two	The first axis Independent Variable	Knowledge Creation	05
		Knowledge Storage	04
		Knowledge Distribution	04

Sections	Axis	Minor Variables	Statements
	Knowledge Management	Use of Knowledge	05
	The second axis Mediating Variable **Intellectual capital**	Human Capital	06
		Organizational capital	05
		Customer capital	05
	The third axis Dependent Variable **Competitive superiority**	Cost	03
		Flexibility	04
		Quality	03
		Time and fast delivery	03

Source: Prepared by the Researchers.

The total number of statements in the questionnaire is 52 statements, which were emptied according to a statistically validated Likert pentagonal scale. The critical significance level was set at 0.05, at which hypotheses of non-significance are either accepted or rejected[1] A null hypothesis is accepted if the calculated significance level in the program is greater than the critical significance level. Conversely, if the calculated significance level is less than the critical significance level, the null hypothesis is rejected and the alternative hypothesis is accepted[2].

3. Methodology:

3.1. Sample and Procedures:

The study population consists of public and private banks operating in Annaba. Commercial banks were specifically chosen in Annaba, considering that it is one of the largest provinces in eastern Algeria in terms of population density and a significant industrial hub in Algeria. This necessitated Algerian public and private banks to open numerous branches to cater to various customer segments and provide them with services**.**

a. **Public Banks:** National Bank of Algeria (BNA), People's Credit of Algeria (CPA), National Savings and Provision Fund (CNEP), Local Development Bank (BDL), External Bank of Algeria (BEA), Agricultural Bank for Rural Development (BADR).

[1] . The significance level is the probability of rejecting the null hypothesis when it is true, which constitutes a Type I error and is denoted by the symbol α Practically, we usually use the scientifically acceptable confidence level of 95% or higher and an error rate of 5% or lower. It is rare in social sciences to have a confidence level of 100%, but the lower the potential error rate set by the researcher, the stronger the study. For example, if a researcher wants the potential error rate to be 1%, many conditions must be met before this can be achieved, including having a large and diverse sample and a valid measurement scale. Therefore, many conditions must be met before it can be said that the error rate is very low. However, in reality, this is not practical because a 1% rate, when distributed naturally, is at the extremes, significantly limiting other probabilities that usually exist in social studies, which the researcher may overlook. This means accepting the null hypothesis, placing the researcher between two choices: if the error rate is significantly reduced, it means accepting the null hypothesis; conversely, the higher the potential error rate, the weaker the study. Therefore, a balance between the two choices is necessary.

[2] . When using the SPSS program, there is no need to compare with tabulated values; it is sufficient to compare the significance level calculated in the program with the critical significance level to judge whether to accept or reject the null hypothesis.

b. **Private Banks:** Algerian General Society (SGA), BNP Paribas El Djazair (BNP), Al Baraka Bank Algeria, Al Salam Bank Algeria (ASBA), Gulf Bank Algeria (AGB), Trust Bank Algeria (TBA), Fransabank El-Djazair.

The analysis unit for this study was the individual (employee), encompassing all employees across different job levels including (manager, deputy manager, department head, experienced employees). This approach follows several studies and addresses both the research questions and hypotheses selected. The research topic ensures capturing all perspectives and positions of employees regarding KM processes implemented in banks, how banks handle their IC, and how they incentivize and support it to achieve Competitive superiority, customer proximity and meet their needs. This is based on the premise that all employees are closest to and directly engaged with these realities. The table below illustrates the distribution of study participants.

A convenience sample is selected without specifying particular employees, but rather available and accessible participants in a sample of banks operating in Annaba. We distributed 423 forms to employees working in 40 agencies. 15 forms were deemed invalid for analysis, and we lost 68 forms, while 340 valid forms were retrieved, representing 80.37% of the distributed forms.

3.2. Measurement Model Analysis:

The data obtained from the questionnaire were entered and analyzed using the Statistical Package for the Social Sciences (SPSS), maintaining the sequence for each bank separately. Additionally, AMOS (Analysis of Moment Structures) and G*Power software were used. The following statistical tests were employed:

- Cronbach's Alpha test to measure the reliability and stability of questionnaire items;
- Pearson correlation coefficient to measure correlation, in order to confirm the validity of internal consistency and construct of questionnaire items and dimensions;
- The initial sample size using the G*Power software, which focuses particularly on cases involving a mediator variable; and
- Structural Equation Modeling (SEM) was used to test the validity and fit of the theoretical model with the sample data. Confirmatory factor analysis was employed to determine whether the data actually measured what was intended. If the sample data supported the theoretical model, more complex theoretical models could be hypothesized. If not supported, the original model would be adjusted and retested, or alternative models developed and tested.

3.2.1. Sample Size:

One of the significant issues where there is considerable variation is the appropriate sample size, especially concerning considerations and needs related to the use of factor analysis. Tighaza pointed out that factor analysis has become a statistical method that requires a large sample (100 individuals or more) to be acceptable, although it is preferable for the total sample to be 200 individuals or more (Tighaza, 2012, p. 24). Some references recommend using a ratio of 10 to 1

(10 individuals per measured variable) or 15 individuals per variable. In this study, researchers attempted to determine the sample size using the G*Power software, which is widely used especially in the presence of a mediator variable to determine the minimum sample size. The adequacy of the study sample was also examined using the Kaiser Meyer Olkin test.

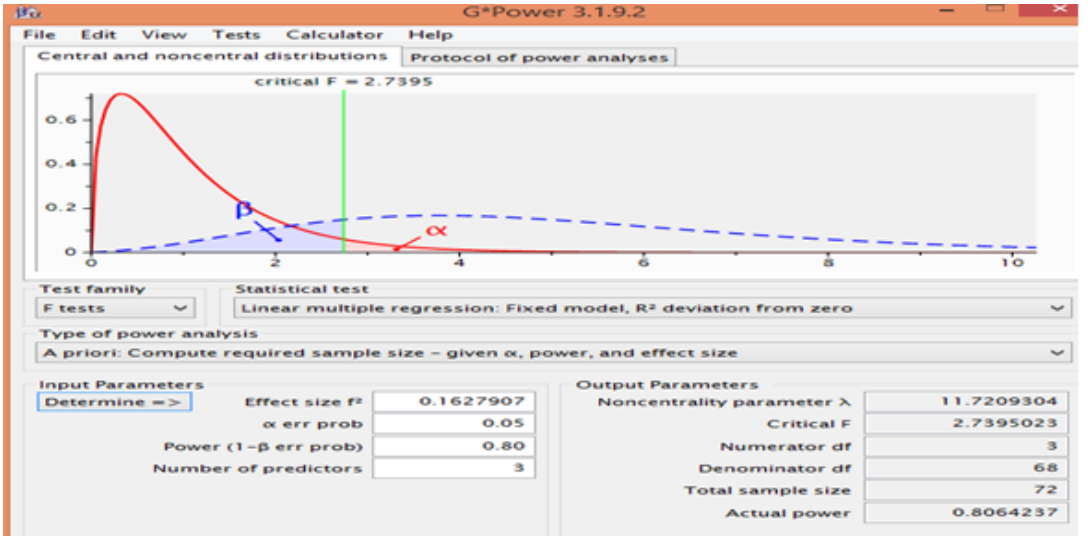

Figure 2. Determining the Minimum Sample Size G*Power
Source: Prepared by Researchers based on G*Power Software Outputs

According to G*Power software outputs, the minimum required sample size for conducting the test is 72 individuals (total sample size = 72), at a high effect size of 95%.

3.2.2. The Adequacy of the Sample Size:

To assess the adequacy of the sample size, Bartlett's Test and the Kaiser-Meyer-Olkin (KMO) test will be used. The KMO test measures the degree of homogeneity of values and the adequacy of sample size for conducting factor analysis. If the KMO test value exceeds 0.5, it indicates sufficient homogeneity and suitability for factor analysis. Bartlett's Test (Bartlett's Test of Sphericity) is used to accept or reject the hypothesis of no relationships, stating that the correlation matrix is an identity matrix (no relationships exist), meaning zero correlation between variables in the matrix. Therefore, it becomes difficult or impossible to conduct factor analysis. Kaiser suggests acceptance values for this indicator: values ranging from (0.5) to (0.7) are acceptable, (0.7) to (0.8) indicate a good level, (0.8) to (0.9) indicate a very good level, and values exceeding (0.9) indicate an excellent level with high confidence and commendation (Tighaza, 2012, p. 89). The following table illustrates the results:

Table 3. The KMO test for Sample Adequacy

Axis	***Sig***	***Kaiser-Meyer-Olkin Measure of Sampling Adequacy***
The First Axis	0.000	0.859
The Second Axis	0.000	0.908
The Third Axis	0.000	0.900
The Whole Questionnaire	0.000	0.924

Source: Prepared by Researchers based on SPSS V26 Software Outputs.

Table 3. indicates that the KMO test value is greater than the minimum acceptable threshold for this test, which is (0.5). Therefore, the sample size is adequate for the current analysis. Also, the test shows significance at all probability levels (at a level of 0.01 or lower). Thus, the null hypothesis should be rejected, confirming that the correlation matrix does not represent an identity matrix. This means that the correlation matrix has sufficient correlations that make it suitable for factor analysis.

3.2.3. Indicators of Goodness of Fit:

This describes a sample of goodness of fit indicators that are considered more effective than others, and the following table illustrates the goodness of fit indicators against which the results are compared.

Table 4. Indicators of Goodness of Fit

Index	**The Ideal Range of the Indicator**
) Chi-square(	Not statistically significant
Degrees of freedom) Chi-square/df(	Less than 5 indicates acceptance and good fit
Comparative fit index) cfi(	Greater than 0,95 indicates a better fit
Tucker-lewis index) TLI(	> 0.9
(REMSEA) Root mean square error of approximation	>0.05Rmsea 0.08 >
Goodness of fit index) GFI(	> 0.90
Adjusted goodness of fit index)AGFI(	> 0.90
Normed fit index) NFI(	> 0.90
Incremental fit index) IFI(	> 0.95

Source: (http://amosdevelopment.com/webhelp/index.html?textmacros1.htm, s.d.)

3.2.4. Reliability of the Study Tool:

The reliability of the questionnaire means that if it is redistributed to another sample with the same size from the same population, the results will be similar to those obtained from the first sample. The results will be consistent with a probability equal to the reliability coefficient. According to the results of this test,

the questionnaire is either accepted, or needs to be adjusted. This test is used to assess whether the questionnaire's questions are consistent with each other.

3.2.4.1. Cronbach's Alpha Coefficient:
bellow illustrates the reliability coefficient of each axis and the entire questionnaire.

Table 5. Cronbach's Alpha Coefficient for Measuring the Reliability of Study Axes

Variables	The Dimension	Number of Statement	*Cronbach's Alpha*
Knowledge Management	Knowledge Creation and Acquisition	5	0.698
	Knowledge Storage	4	0.796
	Knowledge Distribution	4	0.649
	Use of knowledge	5	0.731
The first Axis		**18**	**0.887**
Intellectual Capital	Human Capital	6	0.860
	Organizational Capital	5	0.771
	Customer Capital	5	0.749
The Second Axis		**16**	**0.893**
Competitive Advantage	Cost	3	0.801
	Flexibility	4	0.699
	Quality	3	0.756
	Time and Fast Delivery	3	0.755
The Third Axis		**13**	**0.888**
Total Measurement		**47**	**0.952**

Source: primary data output.

From the results of table 5. it is evident that the Cronbach's Alpha coefficient for the entire questionnaire is 0.95. This indicates that the questionnaire exhibits an excellent level of reliability, meaning that if the same questionnaire were administered again, the responses would be consistent 95%. This level of reliability is highly accepted in the study. The Cronbach's Alpha coefficient for the remaining axes and dimensions is also acceptable, allowing for the completion of the study.

3.2.4.2. Validity of the Study Tool:

The validity of a questionnaire means that it accurately represents the study population, indicating that the answers obtained from the questionnaire provide the intended information. It refers to the process of ensuring that the tool (scale) used in this study actually measures what it is intended to measure. It involves confirming that the questionnaire items can accurately gather data through two stages:

3.2.4.2.1. External Validity:

After constructing the questionnaire, it is presented to a group of specialists and professors experienced in the field of constructing research questionnaires. This

is done to determine the clarity of the statements and their ability to achieve the study's objectives.

3.2.4.2.2. The Reliability of the Questionnaire's Internal Consistency:

Internal consistency reliability refers to the extent of consistency and correlation of each statement within the questionnaire items with the axis that it belongs to. This is assessed by calculating correlation coefficients (Pearson correlation) to ensure the validity of the study tool for the study sample of 340. If the correlation coefficient is significant and large, it can be said that the questionnaire exhibits an excellent level of construct validity and reliability.

Table 6. Pearson Correlation Coefficients for the Statements of each Axis with the Axes' Total Score

Statement	***Axis Correlation***	***Statement***	***Axis Correlation***	***Statement***	***Axis Correlation***
The first axis Knowledge Management		**The second axis Intellectual capital**		**The third axis Competitive superiority**	
01	,488**0	**01**	,601**0	**01**	,595**0
02	,649**0	**02**	,691**0	**02**	,669**0
03	,599**0	**03**	,689**0	**03**	,671**0
04	,646**0	**04**	,690**0	**04**	,653**0
05	,554**0	**05**	,789**0	**05**	,569**0
06	,572**0	**06**	,767**0	**06**	,638**0
07	,612**0	**07**	,675**0	**07**	,717**0
08	,669**0	**08**	,648**0	**08**	,689**0
09	,622**0	**09**	,636**0	**09**	,640**0
10	,507**0	**10**	,726**0	**10**	,740**0
11	,503**0	**11**	,479**0	**11**	,662**0
12	,678**0	**12**	,472**0	**12**	,745**0
13	,662**0	**13**	,550**0	**13**	,552**0
14	,630**0	**14**	,488**0	**14**	
15	,585**0	**15**	,556**0	**15**	
16	,592**0	**16**	,414**0	**16**	
17	,629**0	**17**		**17**	
18	,461**0	**18**		**18**	

(**) The correlation is significant at the 0.01 level (bilatéral)
(*) The correlation is significant at the 0.05 level (bilateral).
Source: primary data output based on SPSS V26

From the results of table 6. above, the correlation coefficients for all items with their respective axis are statistically significant. This indicates internal consistency among the statements of each axis. It is worth noting that in the context of internal consistency—whether the correlation is weak or strong—causality is not being investigated; rather, what matters is the statistical significance of the correlations. Particularly, internal consistency is considered as a measure of validity and/ or reliability. However, the most significant measure of

validity is constructing validity, which will be calculated using AMOS V25 software.

3.2.4.2.3. Construct Validity:

The confirmatory factor analysis (CFA) focuses on analyzing the measured attribute into knowledge elements and the extent to which they measure what they are intended to measure. CFA was used to assess the construct validity of the research measures. This model is statistically tested, and the construct validity evidence in CFA includes convergent and discriminant validity, which essentially tests confirmatory factor models. These models analyze a specific variable into dimensions and factors assumed to constitute its core or structure (Tighaza, 2012, p. 152). The results of the CFA are depicted in the following three figures:

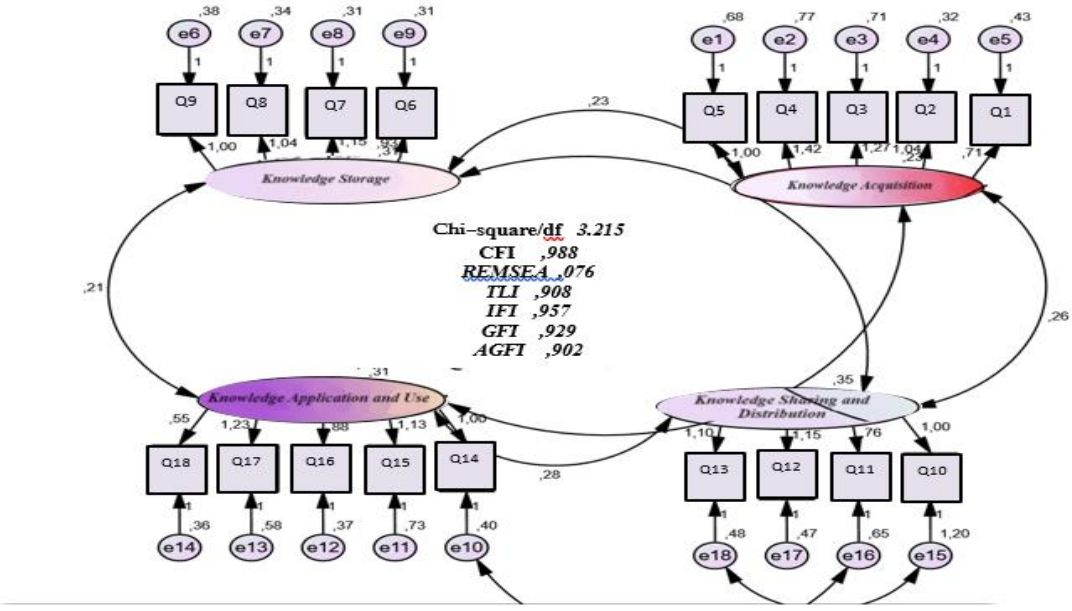

Figure 3. CFA of the KM Dimension
Source: Prepared by the Researchers based on AMOS V25 Software Outputs.

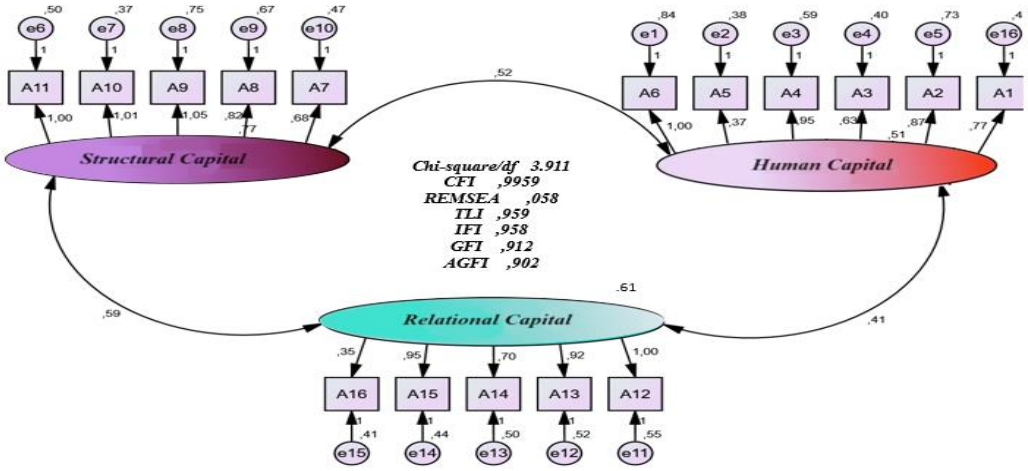

Figure 4. CFA of the IC Dimension
Source: Prepared by the Researchers based on AMOS V25 Software Outputs

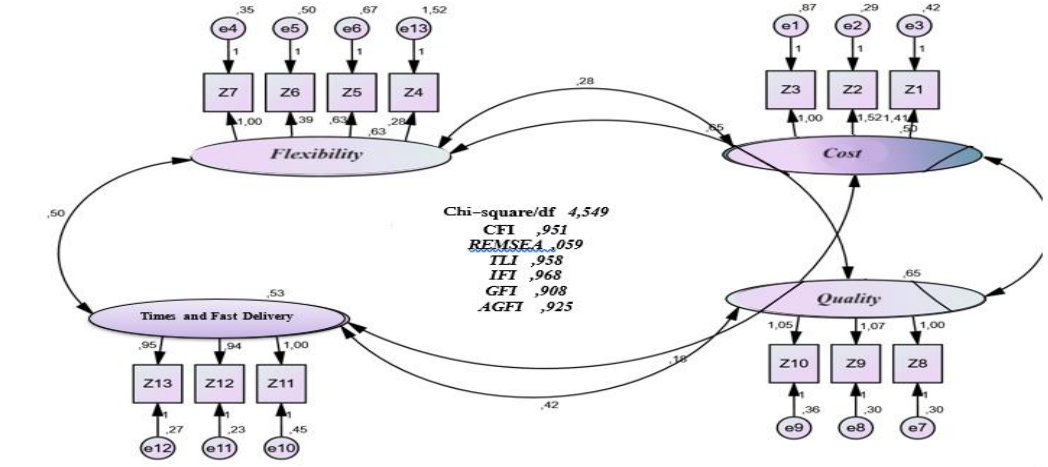

Figure 5. CFA for the Competitive Superiority Dimension
Source: Prepared by the Researchers based on AMOS V25 Software Outputs.

Evidently, the indices of the extracted fit quality indicating in the three figures above (3., 4. and 5.) that the three models achieved good fit indicators for indicators of goodness of fit (compared to Indicators of Goodness of Fit mentioned earlier in Table 4.), with non-significant chi-square values. The standardized chi-square values were less than 5 for each dimension respectively (3.21, 3.91, 4.54), which is a good indicator for the three models. The Tucker-Lewis index was also good with a value of (0.908) for the first dimension, (0.959) for the second dimension, and (0.958) for the third dimension, indicating good data model fit. Additionally, the RMSEA index, a crucial indicator in structural modeling, was

(0.076) for the first dimension, and (0.058), (0.059) for the second and third dimensions respectively. Moreover, most of the factor loading values governing item acceptance and validity met the criterion, as each value was greater than or equal to (0.50), indicating that the items for each dimension of the three dimensions were valid for measurement.

Table 7. The Arithmetic's Mean and Standard Deviation of the Study Variables in the Banks under Study

Bank	Knowledge Management		Bank	Intellectual capital		Bank	Competitive superiority	
	Mean	Deviation Standard		Mean	Deviation Standard		Mean	Deviation Standard
BNP BARIPAS	4.51	0.31	BNP BARIPAS	4.43	0.39	BNP BARIPAS	4.55	0.48
FRANS ABANK	4.24	0.30	FRANS ABANK	4.07	0.62	BNA	4.20	0.47
BDL	4.10	0.38	BNA	4.05	0.51	TRUST BANQ	4.11	0.37
TRUST BANQ	4.08	0.45	ALSALAM	3.99	0.36	ALSALAM	4.08	0.31
CNEP	4.04	0.55	BDL	3.94	0.52	CNEP	4.07	0.51
ALSALAM	4.02	0.33	CNEP	3.93	0.50	EL BARAKA	4.04	0.18
AGB	4.00	0.23	SGA	3.92	0.24	FRANS ABANK	4.03	0.68
EL BARAKA	4.00	0.32	EL BARAKA	3.91	0.37	SGA	3.99	0.18
BNA	3.96	0.51	AGB	3.89	0.37	BDL	3.99	0.45
CPA	3.86	0.72	TRUST BANQ	3.82	0.65	BADR	3.99	0.70
BADR	3.81	0.62	BADR	3.65	0.59	AGB	3.97	0.36
SGA	3.77	0.26	CPA	3.52	0.75	CPA	3.60	0.71
BEA	3.59	0.61	BEA	3.48	0.61	BEA	3.67	0.56

Source: Prepared by the Student based on SPSS V26 Software Outputs.

Based on table 7., when comparing the banks, we find that all the of them apply KM to varying degrees, with an arithmetic mean ranging from (3.59-4.51) according to the responses of the sample members, indicating agreement. For the IC axis, the arithmetic means ranges from (3.48-4.43), according to the responses of the sample members, indicating agreement. For the Competitive superiority axis, the arithmetic mean ranges from (3.67-4.55), according to the responses of the sample members, indicating agreement. BNP PARIBAS, the foreign private bank, ranked first in all axes, while BEA, the Algerian public bank, ranked last in all axes.

Table 8. The Arithmetic's Mean and Standard Deviation of the Study Variables by Type of Bank

Banks	Knowledge Management		Banks	Intellectual capital		Banks	Competitive superiority	
	Mean	Deviation Standard		Mean	Deviation Standard		Mean	Deviation Standard
Private Banks	4.03	0.37	Private Banks	4.00	0.41	Private Banks	4.10	0.38
Public Banks	3.88	0.59	Public Banks	3.78	0.62	Public Banks	3.92	0.60

Source: Prepared by the Student based on SPSS V26 Software Outputs.

From table 8., it is also clear that private banks ranked the first in the three axes, respectively, with arithmetic means of (4.03, 4.00, 4.10) at an acceptable level and

low standard deviations of (0.38, 0.41, and 0.37). This indicates a low dispersion in the responses of the individuals, meaning that the sample members agree that the bank strives to achieve Competitive superiority, applies KM, and meets the requirements of IC.

4. Results and Discussion:

The statistical data analysis process relied on Path Analysis, one of the Structural Equation Modeling (SEM) methods, which is concerned with studying and analyzing the relationships between one or more independent variables and one or more dependent variables to identify the most important indicators or factors that affect the dependent variable(s). Structural Equation Modeling combines multiple regression analysis and factor analysis. Path Analysis is an extension of multiple regression analysis but is more effective as it considers interactions between variables, nonlinearity, measurement errors and multicollinearity among independent variables. The unique advantage of Path Analysis is that it does not include latent variables (AL-Ariqi, 2015). Path Analysis was used to test the hypothesis using the AMOS V25 software, and the results are displayed in the following tables

4.1. Testing and Analyzing the First Hypothesis Results (H_1):

H_0: There is no direct positive effect of KM processes on IC in the banks under study.
H_1: There is a direct positive effect of KM processes on IC in the banks under study**.**

Table 9. Direct effect results of KM on IC

Axis	Path	Axis	*Estimate*	*S.E.*	*C.R.*	P value
Intellectual capital	<--	Knowledge Management	**0,590**	**0,052**	**11,431**	***
Customer capital	<---	Intellectual capital	1,000			
Organizational capital	<---	Intellectual capital	1,714	0,140	12,254	***
Human Capital	<---	Intellectual capital	2,597	0,210	12,343	***

Source: AMOS V25 Software Outputs.

Based on table 9, the path coefficient from KM processes to IC is (0.590), which is statistically significant at a significance level of (0.000). The path analysis results indicate that there is an effect of each dimension of KM process on IC in the banks operating in Annaba. The significance level for all dimensions is less than the significance level (0.05), indicating that KM process have a significant overall impact on IC. Therefore, we reject the null hypothesis and accept the alternative hypothesis, which states that: «**There is a positive effect of KM process on IC in the banks under study**"

4.2. Testing and Analyzing the Results of the Second Hypothesis (H_2):
4.3.

H_0: There is no direct positive effect of IC on achieving Competitive superiority in the banks under study.
H_1: There is a direct positive effect of IC on achieving Competitive superiority in the banks under study.

Table 10. Direct effect results of IC on achieving Competitive superiority

axis	Path	axis	*Estimate*	*S.E.*	*C.R.*	P value
Competitive Superiority	<---	Intellectual capital	0,861	0,236	3,642	***
Cost	<---	Compétitive superiority	1,000			
Flexibility	<---	Compétitive superiority	1,427	0,114	12,533	***
Quality	<---	Compétitive superiority	1,109	0,090	12,381	***
Times And Fast Delivery	<---	Compétitive superiority	1,077	0,094	11,437	***

Source: AMOS V25 Software Outputs.

Table 10. displays that the path coefficient from IC to Competitive superiority is (0.861), which is statistically significant at a significance level of (0.000). The path analysis results indicate that there is an effect of each dimension of IC on achieving Competitive superiority in the banks operating in Annaba. The significance level for all dimensions is less than the significance level (0.05). Thus, we reject the null hypothesis and accept the alternative hypothesis.

4.4. Testing and Analyzing the Results of the Second Hypothesis (H_3):

H_0: There is no direct positive effect of KM processes on achieving Competitive superiority in the banks under study.
H_1: There is a direct positive effect of KM processes on achieving Competitive superiority in the banks under study**.**

Table 11. Direct effect results of KM on Achieving Competitive superiority

Axis	Path	Axis	*Estimate*	*S.E.*	*C.R.*	P value
Competitive superiority	<---	Knowledge Management	**-0,068**	**0,140**	**-0,487**	**0,626**
Knowledge acquisition	<---	Knowledge Management	01			
Knowledge storing	<---	Knowledge Management	0,715	0,053	13,547	***
Knowledge sharing	<---	Knowledge Management	0,886	0,057	15,416	***
Use of knowledge	<---	Knowledge Management	0,943	0,062	15,324	***

Source: AMOS V25 Software.

Based on table 11. the path analysis from KM processes to Competitive superiority yielded a coefficient of (-0.068), which is not statistically significant (p = 0.626). The path analysis results indicate that there is no significant effect of any dimension of KM processes on achieving Competitive superiority in the banks operating in Annaba. The significance level (0.626) is greater than the significance level (0.05). Thus, we reject the alternative hypothesis and accept the null hypothesis, which states that:
"There is no direct positive effect of KM process on achieving Competitive superiority in the banks under study," despite the presence of a correlational relationship between dimensions of KM process and Competitive superiority as indicated by Pearson's correlation coefficient.

Table 12. Pearson Correlation matrix between KM and Competitive superiority

The Independent Variable	The Dependent Variable	Pearson Correlation Coefficient	P value
Knowledge Management Processes	*Competitive superiority*	**0.663****	**0,000**
Knowledge Creation and Acquisition		0.556**	0,000
Knowledge Storage		0.516**	0,000
Knowledge Distribution		0.506**	0,000
Use of Knowledge		0.616**	0,000

Source: Prepared by Researchers based on SPSS V26 Software.

Table 12. indicated that it is evident that there is a statistically significant correlation between KM process and Competitive superiority, as the Pearson correlation coefficient for the overall axis of KM process is (0.663**) with a significance level less than (0.05). Similarly, for each dimension of KM process and Competitive superiority, all were below the significance level of 0.05, indicating a statistically significant correlation relationship.

Despite the fact that the banks under study use KM in their operations, as confirmed by the t-test, they do not reach the required level to achieve Competitive superiority. Effective KM should align with the use of modern technology in information and communication fields. This alignment is crucial for facing competition, as banks need to develop their systems, improve service and product quality, update communication devices and operating systems, and offer advanced financial services to compete internationally. They also need to expand their customer and investor base, and invest in intellectual capital while preserving it.

Nowadays, the focus is on innovating new products to ensure Competitive superiority, thereby attracting a larger customer base. Furthermore, each bank must strive to increase its number of branches, ensuring proximity to customers to save their time and effort. This includes introducing services that facilitate banking operations such as internet services and call centers. Also, continuous investment in ICT that supports KM is essential.

Moreover, among the factors limiting the impact of KM on achieving Competitive superiority is the organizational culture within banks. This culture often neglects the development of a work environment that includes values, behaviors and ideas that guide human capital. An organizational culture that does not empower workgroups to face the challenges of creativity and innovation hampers the effective use of KM for development.

Additionally, an individualistic culture prevents the sharing, distribution, reuse and exchange of knowledge, all leading to negative outcomes that affect the implementation of KM in banks. Consequently, this impacts their ability to compete effectively and achieve Competitive superiority. The organizational structure in Algerian banks is also rigid, hindering the optimal use and flow of KM across various organizational levels. Thus, a flexible organizational structure enables rapid response to rapid technological advancements amidst new competition.

4.5. Testing and Analyzing the Results of the Fourth Hypothesis (H_4):
4.6.

H_0: There is no positive indirect effect of KM process on achieving Competitive superiority through IC as a mediator in the banks under study.
H_1: There is a positive indirect effect of KM process on achieving Competitive superiority through IC as a mediator in the banks under study**.**

To study the indirect effect of KM on achieving Competitive superiority with IC as a mediator, a structural model using Path analysis and AMOS V25 software was employed as shown in the following figure:

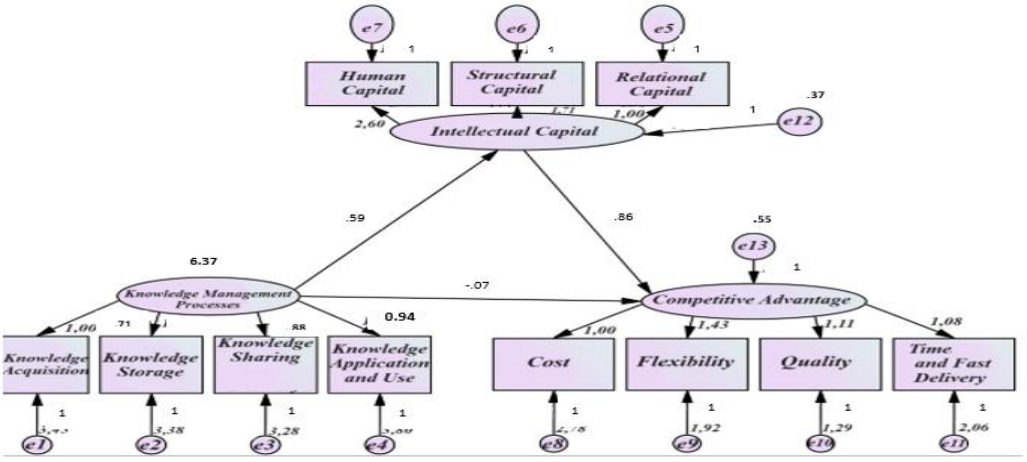

Figure 6. Path Model of the Effect of KM on Competitive superiority in the Presence of IC as a Mediating Variable.
Source: AMOS V25 Software.

From figure 6. which depicts the structural model of the effect of KM on Competitive superiority in the presence of IC as a mediating variable, there is an indirect effect between the independent variable and the dependent variable. After testing the mediating variable, it is essential to verify the significance of the test

using the Sobel test. The latter is one of the methods to test the mediating variable by multiplying the value of the relationship between (the independent variable and the mediating variable) by the value of the relationship between (the mediating variable and the dependent variable). According to Sobel test, if this value is greater than (0.08), it is statistically significant; indicating that the IC in the model is a mediating variable (Azouz, 2018, p. 317). SOBEL test was calculated as shown in the following table:

Table 13. SOBEL Test

Entrée:			Statistique du test :	Erreur Std. :	Valeur *de p* :
un	.590	Test de Sobel :	3.47317228	0.1462611	0.00051435
b	.861	Test d'Aroian :	3.46101087	0.14677504	0.00053815
s_a	.052	Test de Goodman :	3.48546278	0.14574535	0.00049129
s_b	.236	Tout réinitialiser		Calculer	

Entrée:			Statistique du test :	Valeur *de p* :
t_a	3.47317228	Test de Sobel :	2.45159265	0.01422256
t_b	3.46101087	Test d'Aroian :	2.4021434	0.01629932
		Test de Goodman :	2.50422709	0.01227192
		Tout réinitialiser	Calculer	

Source: (http://quantpsy.org/sobel/sobel.htm, s.d.)

The results of SOBEL test shown in table 13. indicate that all tests related to the mediating variable are significant. Therefore, we reject the null hypothesis and accept the alternative hypothesis, which suggests that there is a mediating role in the relationship between KM and achieving Competitive superiority in the banks under study. It is necessary to analyze whether the mediating variable improves the effect or not.

After confirming the significance of the mediating variable, we can analyze the results based on the table of regression weights, standard error and significance level for the effect of KM on achieving Competitive superiority in the presence of IC as a mediating variable, the results are displayed in the following table:

Table 14. Indirect effect results of KM on Achieving Competitive superiority in the presence of IC

axis	Path	axis	*Estimate*	S.E.	C.R.	P value
Intellectual capital	<---	Knowledge Management	**0,590**	0,052	11,431	***
Compétitive superiority	<---	Intellectual capital	**0,861**	0,236	3,642	***
Compétitive superiority	<---	Knowledge Management	**-0,068**	0,140	-0,487	**,626**

Source: AMOS V25 Software.

From table14., it is evident that IC plays a mediating role in the relationship between KM and achieving Competitive superiority. This means that KM influences the achievement of Competitive superiority through the presence of IC as a mediating variable. The following observations can be made:
KM does not directly affect the achievement of Competitive superiority in the absence of the mediating variable. To calculate the effect of KM on achieving Competitive superiority in the presence of IC as a mediating variable, we multiply the effect of KM on IC by the effect of IC on Competitive superiority as follows:

Moderating effect results

0.590 * 0 ,861 = 0.507

The mediating variable, IC, plays a full mediating role a **-total mediation-** between KM and Competitive superiority in the banks under study. The results indicate that the mediating effect explains the relationship more comprehensively and supports the impact of the dimensions of IC. This confirms that competitiveness depends on the optimal utilization of IC and the competencies employed by the banks.

5. Conclusion

The current study uses several statistical tests through structural equation modeling, primarily confirmatory factor analysis and path analysis. These methods enable the testing of the proposed study hypotheses and allow the treatment of the study hypotheses as a single unit. Path analysis, in particular, allows handling multiple variables simultaneously, which is a scientific advantage provided by modeling. This is achieved by examining the perspectives of the study sample, represented by a sample of banks operating in Annaba.

Consequently, IC plays a significant role in mediating the relationship between KM and Competitive superiority This reaffirms the importance of IC in organizations, as it represents a future Competitive superiority for banks. Therefore, relying on it as a competitive resource ensures more efficient sustainability of the institution's competitiveness compared to relying solely on material, financial and technological resources. However, there should also be

integration between material, financial and human resources. Based on the practical analyses of the study, the following conclusions can be drawn:

- Through the analysis of the hypothesis results, it was confirmed that the sample of banks operating in Annaba uses KM in managing their activities, possesses good IC, and strives to achieve Competitive superiority.
- The analysis of the hypothesis results revealed that the sample of banks operating in Annaba uses KM to manage their activities, has good IC, and seeks for a competitive superiority.
- The analysis of the results of the second hypothesis revealed that there is a direct impact of IC on achieving Competitive superiority in the banks operating in Annaba under study.
- The analysis of the results of the third hypothesis demonstrated that there is no direct impact of KM process on achieving Competitive superiority in the banks operating in Annaba under study.
- Analyzing the results of the third hypothesis; there is an indirect effect of KM process on achieving Competitive superiority in the presence of IC in banks operating in Annaba under study, where IC mediates-total mediation- the relationship between KM and Competitive superiority.
- The study sample estimates the necessity for Competitive superiority plans and strategies to focus on quality and continuous service improvement, investing in and developing IC, and leveraging information technology and communication as pillars for KM.
- There are significant marketing opportunities available to Algerian banks in the study sample to attract new customers. A large proportion of the population still does not engage with banks due to a lack of banking trust and the absence of nearby bank branches.
- Facing competition will only come about if Algerian banks enhance their systems, improve the quality of their services and products, update their communication devices and operating systems, offer advanced financial services to meet international competition, expand their depositor and investor base, and prioritize investment in IC while preserving it.
- Algerian banks, especially national ones, are not keeping pace with developments in the intellectual field, both in theory and in practice. This is evident as Algerian banks still lag behind significantly in rankings.
- Algerian banks in the study sample currently lack research development and knowledge departments, as well as suitable competencies. It is crucial to strengthen relationships with universities, research laboratories and specialized institutions to leverage their expertise and benefit from them.

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