Presenting a Model of Intellectual Capital Influencing Profitability Returns

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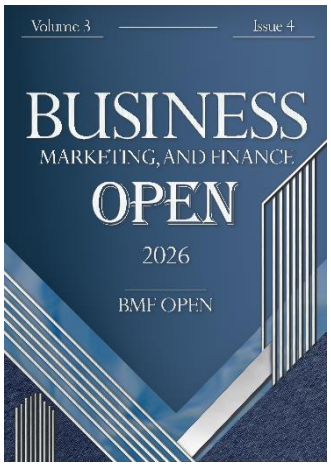

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Abstract: The purpose of this study was to present a model of intellectual capital influencing the level of profitability returns among managers of private and public institutions and organizations. To achieve this objective, an exploratory mixed-methods research design (qualitative–quantitative) was employed. In the qualitative phase, semi-structured interviews with experts and the Delphi technique were used to identify the dimensions, components, and indicators of intellectual capital affecting profitability returns. Qualitative data analysis, conducted through theoretical coding based on interviews with 15 participants, led to the identification of three main dimensions of effective intellectual capital: human capital, structural capital, and relational capital. In the quantitative phase, a questionnaire was developed based on the qualitative findings and distributed among a sample of 384 managers from private and public institutions and organizations. The validity and reliability of the instrument were confirmed through content validity, construct validity (confirmatory factor analysis), and Cronbach's alpha. Quantitative data were analyzed using descriptive statistics and the Friedman test. The results indicated that, from the managers' perspective, human capital is the most important dimension of intellectual capital in influencing profitability returns. In addition, the key components within each dimension were identified and prioritized. By presenting an indigenous model of effective intellectual capital and identifying its key dimensions and components in private and public organizations, this study contributes to a better understanding of the role of intangible assets in financial performance and provides guidance for managers seeking to improve profitability returns through effective intellectual capital management. Suggestions for future research are also presented.

Keywords: effective intellectual capital, profitability returns, mixed-methods model, factor analysis, Friedman test, private and public organizations.

1. Introduction

In the contemporary knowledge-based economy, the sources of competitive advantage and value creation have increasingly shifted from tangible assets toward intangible resources embedded in organizations' knowledge structures, human capabilities, and relational networks. Among these intangible resources, intellectual capital has emerged as a central construct for explaining differences in organizational performance, profitability, and long-term sustainability. Intellectual capital encompasses the collective knowledge, skills, processes, and relationships that enable organizations to create value beyond what is reflected in traditional financial statements. As global competition intensifies and markets become more dynamic, understanding how

intellectual capital contributes to profitability has become a critical concern for scholars, managers, and policymakers alike [1, 2].

Traditional accounting systems largely fail to capture the real value generated by intangible assets, leading to a growing gap between book value and market value in many organizations. This limitation has encouraged researchers to explore intellectual capital as a multidimensional construct that complements financial capital and physical assets in explaining firm performance. Prior studies have consistently shown that intellectual capital plays a significant role in enhancing productivity, efficiency, and profitability across various sectors, including banking, manufacturing, agriculture, education, and technology-intensive industries [3-5]. These findings underscore the need for more refined conceptual models that can clarify how different dimensions of intellectual capital interact to influence financial outcomes.

Theoretical frameworks commonly conceptualize intellectual capital as comprising three core dimensions: human capital, structural capital, and relational capital. Human capital refers to employees' knowledge, skills, experience, creativity, and problem-solving abilities. Structural capital includes organizational processes, routines, information systems, databases, and organizational culture that support knowledge creation and utilization. Relational capital encompasses relationships with customers, suppliers, partners, regulators, and other external stakeholders. Together, these dimensions form an integrated system that enables organizations to transform knowledge into economic value [2, 6]. However, the relative importance of each dimension and their combined effects on profitability remain subjects of ongoing debate.

Empirical evidence suggests that the relationship between intellectual capital and profitability is not always linear or uniform across contexts. For example, research conducted in emerging and developing economies has demonstrated that the effectiveness of intellectual capital depends on institutional environments, industry characteristics, and organizational strategies [7, 8]. In some cases, excessive investment in certain intangible assets may not immediately translate into higher profitability, highlighting the importance of balanced and strategic management of intellectual capital components. This nonlinearity has motivated scholars to move beyond simple correlation analyses toward more comprehensive models that account for contextual and moderating factors [7].

Sector-specific studies further illustrate the diverse pathways through which intellectual capital affects financial performance. In the banking and financial services sector, intellectual capital has been shown to improve asset utilization, risk management, and return on assets, particularly in knowledge-intensive banking systems [6, 9]. In manufacturing and supply chain contexts, intellectual capital supports innovation, process optimization, and circular economy practices, thereby enhancing operational efficiency and profitability [10, 11]. Similarly, in agriculture and resource-based industries, intellectual capital contributes to productivity improvements and sustainable value creation by facilitating knowledge transfer and adaptive decision-making [3, 12].

Recent research has also emphasized the growing interdependence between intellectual capital and digital transformation. Digital technologies such as big data analytics, artificial intelligence, and enterprise information systems amplify the value of intellectual capital by enhancing knowledge integration, communication, and decision-making speed. Studies indicate that digitalization strengthens the impact of intellectual capital on financial performance and innovation outcomes, particularly in environmentally sensitive and knowledge-intensive industries [13, 14]. This interaction suggests that intellectual capital should be examined not as a static resource but as a dynamic capability that evolves alongside technological and organizational changes.

In addition to digital transformation, intellectual capital has been linked to broader organizational outcomes such as innovation capability, competitive advantage, leadership effectiveness, and organizational intelligence.

Human capital-enhancing practices, supportive organizational cultures, and effective knowledge management processes have been found to mediate the relationship between intellectual capital and firm performance [15, 16]. These mediating mechanisms highlight the complexity of intellectual capital management and the need for integrated models that capture both direct and indirect effects on profitability.

From a strategic perspective, intellectual capital is increasingly recognized as a key driver of sustainable competitive advantage. Organizations that successfully align their intellectual capital resources with strategic objectives are better positioned to respond to environmental uncertainty, regulatory pressures, and market volatility. Studies in emerging markets have demonstrated that intellectual capital contributes to resilience and adaptability, particularly when combined with innovation strategies and entrepreneurial orientation [17, 18]. This strategic role underscores the importance of context-specific models that reflect the unique challenges and opportunities faced by organizations in different institutional settings.

Despite the growing body of empirical research, several gaps remain in the literature. First, many studies rely on standardized measurement frameworks such as the Value Added Intellectual Coefficient (VAIC™), which, while useful for cross-country comparisons, may not fully capture the qualitative and contextual dimensions of intellectual capital [1, 19]. Second, there is limited consensus on the relative importance of human, structural, and relational capital in driving profitability, particularly in mixed organizational settings that include both public and private institutions. Third, most existing studies adopt purely quantitative approaches, which may overlook expert knowledge and contextual insights that are critical for model development [20].

Recent conference-based and applied studies have called for mixed-methods approaches to address these limitations by integrating qualitative expert insights with quantitative validation techniques. Such approaches allow researchers to identify contextually relevant components of intellectual capital and to develop models that are both theoretically grounded and empirically robust [21, 22]. By incorporating expert judgment, these studies aim to move beyond generic frameworks and toward practical models that can guide managerial decision-making and policy formulation.

Another important dimension of recent research concerns the role of intellectual capital in supporting sustainability, corporate social responsibility, and environmental compliance. Evidence from developing economies suggests that intellectual capital enhances firms' ability to engage in responsible business practices while maintaining financial performance [23, 24]. This perspective aligns with broader debates on sustainable development and highlights the multifunctional role of intellectual capital in balancing economic, social, and environmental objectives.

Given these theoretical and empirical developments, there is a clear need for comprehensive models that systematically identify, prioritize, and integrate the components of intellectual capital that most strongly influence profitability. Such models should be sensitive to organizational context, sectoral characteristics, and managerial perceptions, while also being supported by rigorous empirical validation. An exploratory mixed-methods approach offers a suitable methodological framework for achieving this goal, as it enables the identification of key components through qualitative inquiry and the testing of their relative importance through quantitative analysis [2, 25].

Accordingly, the present study seeks to contribute to the intellectual capital literature by developing an integrated model of intellectual capital that explains its impact on profitability, drawing on expert insights and empirical evidence to identify and rank the most influential dimensions and components within organizational settings. The aim of this study is to develop and validate a comprehensive model of intellectual capital influencing

profitability by identifying and prioritizing its key dimensions and components using an exploratory mixed-methods approach.

2. Methodology

This study aimed to develop a model of intellectual capital influencing the level of profitability returns. In terms of purpose, it is applied research; in terms of data, it follows an exploratory mixed-methods approach (qualitative–quantitative); and in terms of implementation, it combines systematic grounded theory (qualitative phase) with a cross-sectional survey (quantitative phase).

From the perspective of purpose, this research is applied because it seeks to solve a practical problem and to obtain information for proposing an operational model to improve profitability returns through identifying and understanding the role of intellectual capital. In terms of data, the present study adopts an exploratory mixed-methods design with priority given to the qualitative approach (qualitative → quantitative). In the first phase, qualitative data are collected and analyzed to identify the dimensions, components, and indicators of intellectual capital that affect profitability returns. In the second phase, the qualitative findings are structured into a quantitative instrument (questionnaire) and used to test and generalize the model within a larger statistical population. Regarding the implementation method, a systematic grounded theory approach is used in the qualitative section to explain the dimensions and components of the model, while a cross-sectional survey method is employed in the quantitative section to collect data and test the relationships among variables.

The statistical population and sample in this study were determined separately for the qualitative and quantitative phases, as follows.

The statistical population in the qualitative phase consisted of faculty members of major universities nationwide in the fields of accounting and finance who possessed sufficient expertise and experience in intellectual capital and organizational financial performance. The sample in this phase was selected using purposive theoretical sampling. Accordingly, individuals with deeper knowledge of the research topic were identified and invited to participate in interviews. In addition, snowball sampling was used to identify further experts. The criteria for inclusion in the interviews were as follows.

1. Having at least two scientific research articles published in reputable journals in the field of intellectual capital or financial performance.
2. Having authored or translated at least one book related to the research topic.
3. Having conducted at least two research projects related to intellectual capital or organizational financial performance.

The sample size in the qualitative phase was determined based on the principle of theoretical saturation. After conducting 15 interviews, the researcher concluded that no new data were being generated and that previously identified concepts were being repeated.

The statistical population in the quantitative phase included managers of public and private organizations and institutions. Given the unlimited size of the statistical population, the sample size was calculated using Cochran's sampling formula at a 5% error level ($\alpha = 0.05$). In this study, the sample size calculated using Cochran's formula was 384 participants.

Data in the present study were collected in both qualitative and quantitative sections using library-based and field methods.

In the qualitative section, scientific documents and semi-structured interviews with experts, along with the Delphi technique, were used as data collection tools. The interview guide was developed based on the theoretical foundations and research background and included open-ended questions to explore experts' perspectives on the dimensions and components of intellectual capital and its impact on profitability returns. In the Delphi technique, findings derived from the interviews were formulated into a questionnaire and sent to 15 experts over three rounds in order to achieve consensus on the dimensions, components, and indicators of the model.

To ensure the internal credibility of qualitative data, methods such as reviewing theoretical foundations, peer examination by research team members, and providing rich descriptions of the data were employed. Transferability was ensured through achieving theoretical saturation and providing sufficient detail about the research context. Confirmability of the findings was established through data review and comparison by the researcher and by documenting the research process.

In the quantitative section, the data collection instrument was a researcher-developed questionnaire designed based on the finalized dimensions, components, and indicators identified in the qualitative phase. This questionnaire consisted of three dimensions and 20 items, with responses measured on a five-point Likert scale ranging from "strongly disagree" to "strongly agree."

Data analysis in this study was conducted in two qualitative and quantitative stages.

In the qualitative section, data obtained from interviews were analyzed using theoretical coding procedures (open, axial, and selective coding). This process led to the identification of key concepts, their categorization, and ultimately the development of a conceptual model of intellectual capital influencing profitability returns. Data obtained from the Delphi technique were also analyzed descriptively to determine the level of expert agreement and to prioritize indicators.

In the quantitative section, after data collection, descriptive statistics (such as mean, standard deviation, frequency, and percentage) were used to describe the characteristics of the sample and the research variables. To test the fit of the proposed model and examine the relationships between intellectual capital dimensions and profitability returns, confirmatory factor analysis (CFA) was conducted using LISREL software. The evaluated fit indices included chi-square (χ^2), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), and root mean square error of approximation (RMSEA).

3. Findings and Results

At this stage, various components were collected from different articles, resulting in 18 factors that were classified into different dimensions. Subsequently, a questionnaire was distributed among experts. In the first round, the questionnaire was distributed to 15 experts and included 18 factors, which are presented in the table below.

Table 1. Identification of Intellectual Capital Components Affecting Profitability Returns Based on the Literature Review in the First Delphi Round

Factor	No.	Factor	No.
Learning	10	Rapid decision-making	1
Software system	11	Leadership skills	2
Computer network	12	Documentation	3
Competency	13	Hardware system	4
Skill	14	Customer retention	5
Customer relationship	15	Tacit knowledge	6

Customer satisfaction	16	Organizational commitment	7
Relationship with partners	17	Customer loyalty	8
Commercial brands	18	Work processes	9

Using the Delphi method, experts were asked to identify the components of intellectual capital affecting profitability returns. In this stage, 16 factors were recorded, as presented in the table below.

Table 2. Identification of Intellectual Capital Components Affecting Profitability Returns Based on Expert Opinions in the Second Delphi Round

No.	Factor	No.	Factor
1	Customer feedback system	9	Information system
2	Procedures	10	Policies
3	Functions	11	Relationship with competitors
4	Collaborative culture	12	Distribution channel
5	Sales channel	13	Organizational learning
6	Information database	14	Leadership style
7	Innovation	15	Values
8	Creativity	16	Sustainability rate

Participants were asked to review their responses again and, if necessary, revise their judgments, stating their reasons in cases of disagreement. They were also requested to rank the importance of each item by considering the mean and standard deviation of the scores. Rankings of opinions were performed at this stage as well. Ultimately, 34 factors were identified for determining the components of intellectual capital affecting profitability returns, as presented in the table below.

Table 3. Identification of Intellectual Capital Components Affecting Profitability Returns Based on Expert Opinions and the Literature Review

No.	Indicator	Experts	Literature
1	Rapid decision-making	✓	
2	Leadership skills	✓	
3	Documentation	✓	
4	Hardware system	✓	
5	Customer retention	✓	
6	Tacit knowledge	✓	
7	Organizational commitment	✓	
8	Customer loyalty	✓	
9	Work processes	✓	
10	Customer feedback system		✓
11	Procedures		✓
12	Functions		✓
13	Collaborative culture		✓
14	Sales channel		✓
15	Information database		✓
16	Innovation		✓
17	Creativity		✓
18	Learning	✓	
19	Software system	✓	
20	Computer network	✓	
21	Competency	✓	
22	Skill	✓	
23	Customer relationship	✓	

24	Information system		✓
25	Policies		✓
26	Relationship with competitors		✓
27	Distribution channel		✓
28	Organizational learning		✓
29	Leadership style		✓
30	Values		✓
31	Sustainability rate		✓
32	Customer satisfaction	✓	✓
33	Relationship with partners	✓	✓
34	Commercial brands	✓	✓

After reviewing the indicators obtained based on the third Delphi round, drawing on the literature review and expert interviews, Kendall's coefficient of concordance was examined for the final barriers.

Table 4. Results of Expert Opinions in the Fourth Delphi Round

Indicator	Mean of Expert Opinions	Indicator	Mean of Expert Opinions
q1	0.451	q18	0.523
q2	0.452	q19	0.452
q3	0.563	q20	0.412
q4	0.578	q21	0.231
q5	0.685	q22	0.452
q6	0.523	q23	0.325
q7	0.341	q24	0.425
q8	0.651	q25	0.462
q9	0.458	q26	0.215
q10	0.574	q27	0.451
q11	0.513	q28	0.423
q12	0.452	q29	0.412
q13	0.524	q30	0.425
q14	0.425	q31	0.426
q15	0.123	q32	0.523
q16	0.214	q33	0.417
q17	0.456	q34	0.456

Based on the results shown in the above table, not all indicators obtained scores above 3 to be recognized as final Delphi indicators. To ensure agreement among the Delphi panel, Kendall's coefficient of concordance was examined. Given that not all indicators had scores above 3 and Kendall's coefficient of concordance did not indicate an adequate level (lower than 0.5), the Delphi process was not terminated (W = 0.315).

After reviewing the indicators obtained from the previous round, all indicators were examined in terms of thematic similarity and overlap, and repetitive indicators and those with scores below 3 were eliminated or merged. Subsequently, a structured questionnaire with a five-point Likert scale was developed and provided to the experts.

Table 5. Results of Expert Opinions in the Final Delphi Round

Indicator	Mean of Expert Opinions	Indicator	Mean of Expert Opinions
q1	4.52	q16	4.21
q2	3.56	q17	4.78
q3	4.52	q18	3.69
q4	4.63	q19	4.45
q5	5.63	q20	4.58
q6	4.52	q21	3.57

q7	3.57	q22	4.68
q8	3.47	q23	3.87
q9	4.25	q24	4.98
q10	3.68	q25	3.54
q11	4.12	q26	4.25
q12	3.57	q27	3.47
q13	4.25	q28	4.25
q14	3.68	q29	3.58
q15	3.78	q30	4.58

Based on the results presented in the above table, all indicators with scores above 3 were recognized as the final Delphi indicators. To ensure agreement among the Delphi panel, Kendall's coefficient of concordance was examined.

Given that all indicators obtained scores above 3 and Kendall's coefficient of concordance indicated an acceptable level of agreement, the Delphi process was terminated (W = 0.714). At this stage of the Delphi implementation, based on expert opinions, the finalized model with 30 questionnaire items was randomly distributed among faculty members of major universities in the fields of accounting and finance, and the data were collected.

The first section of the research instrument related to respondents' demographic or general information concerns gender distribution. The results indicate that 56.8% of the selected sample were female and the remaining 43.2% were male. The findings from respondents' demographic statistics regarding work experience show that 35 respondents (9.09%) had less than 5 years of experience, 104 respondents (27.65%) had 6–10 years of experience, 144 respondents (38.26%) had 11–15 years of experience, 70 respondents (18.56%) had 16–20 years of experience, and 31 respondents (6.44%) had 21 years or more of experience.

To summarize the data, descriptive statistical methods (mean, standard deviation, skewness, and kurtosis) were employed.

Table 6. Descriptive Indices of the Research Factors

Factors	Frequency	Standard Deviation	Skewness	Kurtosis
Leadership skills	384	1.208	−0.991	0.513
Documentation	384	1.234	−1.143	0.751
Hardware system	384	1.220	2.370	4.813
Customer retention	384	1.042	−1.066	0.696
Tacit knowledge	384	1.296	1.358	5.470
Organizational commitment	384	1.177	−0.911	0.608
Customer loyalty	384	1.156	−0.398	2.509
Work processes	384	1.490	2.518	7.132
Customer feedback system	384	1.216	−1.006	1.312
Procedures	384	1.261	−0.324	4.215
Functions	384	1.301	−0.862	0.231
Collaborative culture	384	1.216	−0.764	0.412
Sales channel	384	1.502	2.694	7.171
Information database	384	1.228	−0.625	1.694
Innovation	384	1.323	0.840	4.233
Creativity	384	1.462	0.083	4.596
Learning	384	1.170	−0.853	0.389
Software system	384	1.183	−0.619	0.993
Computer network	384	1.450	−1.489	2.225
Competency	384	1.721	−1.711	3.002
Skill	384	1.012	−1.826	4.232

Customer relationship	384	1.618	−1.234	1.005
Information system	384	1.844	−1.390	1.636
Policies	384	1.333	1.253	0.675
Relationship with competitors	384	1.089	−0.794	−0.609
Distribution channel	384	1.175	−1.151	0.553
Organizational learning	384	1.416	−1.227	0.632
Leadership style	384	1.708	−1.139	0.478
Values	384	1.313	1.160	0.798
Customer satisfaction	384	1.615	−0.648	−0.863

After describing the demographic characteristics of the sample and presenting the statistical properties of the research components, data analysis was conducted in two stages. First, the distribution of the data was examined in terms of normality, and then the research questions were addressed using confirmatory factor analysis.

To apply parametric tests, it is necessary to ensure the normality of the population before conducting the analyses. Accordingly, the Kolmogorov–Smirnov test was used.

The results of the Kolmogorov–Smirnov test indicated that the obtained K–S value was not statistically significant, suggesting that the data distribution was normal. Therefore, the use of parametric tests for analyzing the data in this study was deemed appropriate.

At this stage, using quantitative methods such as exploratory factor analysis, the indicators, components, and dimensions of the competency-based education model were confirmed or rejected, and the relative importance of each indicator and component was determined. In other words, to examine the research questions, structural equation modeling was employed, which includes exploratory factor analysis to identify latent variables and confirmatory factor analysis to test the significance of the relationships between observed and latent variables. Based on the Kaiser–Meyer–Olkin (KMO) criterion, only factors with eigenvalues greater than 1 were retained, while factors with eigenvalues less than 1 were eliminated. The assignment of items to factors was determined by referring to the pattern matrix based on factor loadings, which ranged between −1 and +1. Variables with the highest factor loadings on a given factor were grouped and conceptually labeled based on the theoretical framework. Only variables with factor loadings of 0.40 or higher were retained.

The KMO value of 0.619 indicated sampling adequacy, and Bartlett's test of sphericity was statistically significant ($\chi^2 = 1873.714$), demonstrating that the correlation matrix was not an identity matrix. Therefore, factor analysis was justified.

They indicate the communalities (communalities are obtained from the mean of the squared factor loadings). Initial communalities are always equal to 1, as they represent the amount of shared variance before factor extraction. Extracted communalities, however, indicate the extent to which the extracted latent variables can predict the variance of the observed variables. This value should be greater than 0.50 for all items to indicate an acceptable ability of the identified factors to explain variance. The results are presented in the table below.

Table 7. Communalities of the Research Components

Item No.	Initial Communality	Extracted Communality	Item No.	Initial Communality	Extracted Communality
1	1.00	0.764	16	1.00	0.785
2	1.00	0.758	17	1.00	0.869
3	1.00	0.741	18	1.00	0.758
4	1.00	0.742	19	1.00	0.698
5	1.00	0.732	20	1.00	0.758
6	1.00	0.852	21	1.00	0.698

7	1.00	0.745	22	1.00	0.758
8	1.00	0.842	23	1.00	0.759
9	1.00	0.846	24	1.00	0.789
10	1.00	0.845	25	1.00	0.698
11	1.00	0.841	26	1.00	0.987
12	1.00	0.798	27	1.00	0.875
13	1.00	0.847	28	1.00	0.758
14	1.00	0.863	29	1.00	0.865
15	1.00	0.789	30	1.00	0.975

Based on principal component analysis and Varimax rotation in exploratory factor analysis, three factors were identified. As shown in the rotated factor matrix below, 10 items loaded on the first factor with factor loadings greater than 0.40. Twelve items loaded on the second factor with factor loadings greater than 0.70. Eight items loaded on the third factor with factor loadings greater than 0.80.

Table 8. Rotated Factor Matrix Using the Varimax Method

Item No.	Factor 1 (Human Capital)	Factor 2 (Structural Capital)	Factor 3 (Relational Capital)
1	0.646		
2	0.541		
3	0.461		
4	0.562		
5	0.562		
6	0.452		
7	0.474		
8	0.561		
9	0.478		
10	0.521		
11		0.859	
12		0.644	
13		0.714	
14		0.621	
15		0.758	
16		0.698	
17		0.785	
18		0.695	
19		0.851	
20		0.841	
21		0.784	
22		0.714	
23			0.825
24			0.912
25			0.845
26			0.841
27			0.921
28			0.847
29			0.914
30			0.813

1. The first factor showed a strong correlation with 10 items and was labeled “Human Capital.”
2. The second factor showed a strong correlation with 12 items and was labeled “Structural Capital.”
3. The third factor showed a strong correlation with 8 items and was labeled “Relational Capital.”

The reliability of the data collection instrument (questionnaire) was assessed using Cronbach's alpha. The validity of the instrument was examined through content validity (Content Validity Ratio; CVR) and confirmatory validity (confirmatory factor analysis). The results of the CVR and Cronbach's alpha tests are presented in the table below.

Table 9. Validity and Reliability of the Identified Factor Dimensions

Dimension	Validity (CVR)	Reliability (Cronbach's Alpha)
Human capital	0.77	0.82
Structural capital	0.69	0.89
Relational capital	0.55	0.80

An affinity diagram organizes existing observations related to a problem into groups that share logical relationships. In simple terms, this diagram is considered a tool for collecting a large number of ideas, opinions, and verbal expressions and organizing them into specific groups based on their natural relationships. In this method, related components and indicators are grouped according to one or more shared attributes.

Table 10. Final Research Barriers

Factor	Components
Factor 1 (Human Capital)	Leadership skills / Tacit knowledge / Organizational commitment / Innovation / Creativity / Learning / Competency / Skill / Leadership style / Values
Factor 2 (Structural Capital)	Documentation / Hardware system / Work processes / Procedures / Functions / Collaborative culture / Information database / Software system / Computer network / Information system / Policies / Organizational learning
Factor 3 (Relational Capital)	Customer retention / Customer loyalty / Customer feedback system / Sales channel / Customer relationship / Relationship with competitors / Distribution channel / Customer satisfaction

To rank the identified factors, the Friedman test was employed. Using the Friedman test, the researcher is able to identify the most influential factors and provide analytical judgments regarding them. In the Friedman test, the null hypothesis (H_0) assumes no difference among the mean ranks of the variables. At a 5% significance level, if the Sig value or the Friedman statistic is less than 0.05, the null hypothesis is rejected. This indicates that the factors are rankable and that their mean ranks differ significantly from one another.

Table 11. Results of the Friedman Test for the Significance of the Identified Main Factors

Statistic	Value
Sample size	384
Chi-square	145.85
Degrees of freedom	5
Sig.	0.000

Based on the table above, the Sig value of the Friedman statistic is less than 0.05; therefore, the null hypothesis (H_0) is rejected. This indicates that the factors are ranked and that their mean ranks differ significantly. The ranking of the main factors based on the Friedman test is presented in the following table.

Table 12. Ranking Results of the Identified Main Factors

Rank	Factor	Mean Rank
First	Human capital	4.5
Second	Structural capital	4.3
Third	Relational capital	3.7

To rank the identified human capital factor, the Friedman test was used. Through the Friedman test, the researcher can identify the most influential components and provide evaluations regarding them. In the Friedman test, the null hypothesis (H_0) assumes no difference among the mean ranks of the variables. At a 5% significance level, if the Sig value or the Friedman statistic is less than 0.05, the null hypothesis is rejected, indicating that the factors are rankable and that their mean ranks differ significantly.

Table 13. Results of the Friedman Test for the Significance of Human Capital

Statistic	Value
Sample size	384
Chi-square	153.25
Degrees of freedom	5
Sig.	0.001

Based on the table above, the Sig value of the Friedman statistic is less than 0.05; therefore, the null hypothesis (H_0) is rejected. This indicates that the factors are ranked and that their mean ranks differ significantly. The ranking of the human capital components based on the Friedman test is presented in the following table.

Table 14. Ranking Results of Human Capital Components

Rank	Component	Mean Rank
First	Leadership skills	4.4
Second	Tacit knowledge	4.1
Third	Organizational commitment	3.8
Fourth	Innovation	3.5
Fifth	Creativity	3.0
Sixth	Learning	2.7
Seventh	Competency	2.5
Eighth	Skill	2.4
Ninth	Leadership style	2.0
Tenth	Values	1.9

To rank the structural capital factor, the Friedman test was employed. Through the Friedman test, the researcher can identify the most influential components and provide analytical judgments regarding them. In the Friedman test, the null hypothesis (H_0) assumes no difference among the mean ranks of the variables. At a 5% significance level, if the Sig value or the Friedman statistic is less than 0.05, the null hypothesis is rejected, indicating that the factors are rankable and that their mean ranks differ significantly.

Table 15. Results of the Friedman Test for the Significance of Structural Capital

Statistic	Value
Sample size	384
Chi-square	150.36
Degrees of freedom	5
Sig.	0.000

Based on the table above, the Sig value of the Friedman statistic is less than 0.05; therefore, the null hypothesis (H_0) is rejected. This indicates that the factors are ranked and that their mean ranks differ significantly. The ranking of the structural capital components based on the Friedman test is presented in the following table.

Table 16. Ranking Results of Structural Capital Components

Rank	Component	Mean Rank
First	Policies	4.6

Second	Hardware system	4.1
Third	Work processes	3.8
Fourth	Procedures	3.5
Fifth	Organizational learning	3.0
Sixth	Collaborative culture	2.7
Seventh	Information database	2.5
Eighth	Software system	2.4
Ninth	Computer network	2.0
Tenth	Information system	1.9
Eleventh	Documentation	1.8
Twelfth	Functions	1.5

To rank the identified relational capital factor, the Friedman test was applied. Using the Friedman test, the researcher can identify the most influential components and provide analytical judgments regarding them. In the Friedman test, the null hypothesis (H_0) assumes no difference among the mean ranks of the variables. At a 5% significance level, if the Sig value or the Friedman statistic is less than 0.05, the null hypothesis is rejected, indicating that the factors are rankable and that their mean ranks differ significantly.

Table 17. Results of the Friedman Test for the Significance of Relational Capital

Statistic	Value
Sample size	384
Chi-square	157.86
Degrees of freedom	5
Sig.	0.002

Based on the table above, the Sig value of the Friedman statistic is less than 0.05; therefore, the null hypothesis (H_0) is rejected. This indicates that the factors are ranked and that their mean ranks differ significantly. The ranking of the relational capital components based on the Friedman test is presented in the following table.

Table 18. Ranking Results of Relational Capital Components

Rank	Component	Mean Rank
First	Customer retention	4.1
Second	Customer loyalty	3.8
Third	Customer feedback system	3.6
Fourth	Sales channel	3.2
Fifth	Customer relationship	3.0
Sixth	Relationship with competitors	2.8
Seventh	Distribution channel	2.5
Eighth	Customer satisfaction	2.1

4. Discussion and Conclusion

The results of this study provide robust empirical evidence that intellectual capital plays a decisive and differentiated role in shaping organizational profitability. The Friedman test results demonstrated statistically significant differences among the three main dimensions of intellectual capital, confirming that these dimensions are not equally influential in explaining profitability outcomes. Human capital emerged as the most influential dimension, followed by structural capital and relational capital. This finding aligns with a growing body of literature emphasizing the centrality of human-based knowledge, skills, and competencies in driving financial performance in knowledge-intensive and service-oriented economies [1, 2]. The prominence of human capital

suggests that organizations derive superior profitability when they effectively mobilize leadership capabilities, tacit knowledge, organizational commitment, and learning-oriented behaviors. Similar conclusions have been reported in studies conducted across diverse contexts, including manufacturing, banking, agriculture, and education, where human capital was found to be the primary engine of value creation and profitability [3, 4, 16]. The present findings reinforce the argument that, despite advances in technology and systems, human expertise remains the core source of sustainable competitive advantage.

A more granular examination of the human capital dimension revealed that leadership skills and tacit knowledge occupied the highest ranks among human capital components. This result is theoretically consistent with the knowledge-based view of the firm, which posits that tacit, experience-based knowledge embedded in individuals is difficult to imitate and therefore a critical driver of superior performance. Empirical studies have shown that leadership competence enhances strategic alignment, innovation capability, and effective resource allocation, all of which contribute to higher profitability [15, 16]. Moreover, tacit knowledge facilitates problem-solving, innovation, and adaptive decision-making, particularly in volatile and uncertain environments. Prior research in emerging markets has similarly highlighted the importance of tacit knowledge and organizational commitment in translating intellectual capital into financial returns [8, 26]. The relatively lower ranking of values and leadership style suggests that while these elements are important, their financial impact may be more indirect or contingent on other organizational mechanisms.

Structural capital ranked second in overall importance, indicating that organizational infrastructure and internal processes significantly condition the effectiveness of human capital in generating profitability. Among structural capital components, policies, hardware systems, and work processes achieved the highest mean ranks. This finding supports the argument that intellectual capital does not operate in isolation but requires supportive organizational structures to be transformed into economic value. Well-defined policies and efficient processes reduce operational inefficiencies and enhance coordination, thereby amplifying the productivity of human capital [10, 11]. The high ranking of technological infrastructure components, such as hardware and software systems, further reflects the increasing integration of intellectual capital with digital capabilities. Recent studies emphasize that digital systems enhance knowledge storage, sharing, and application, strengthening the link between intellectual capital and financial performance [13, 14]. The present results corroborate this perspective by showing that organizations with stronger structural capital are better positioned to convert knowledge resources into sustained profitability.

Relational capital, although ranked third among the main dimensions, demonstrated a statistically significant contribution to profitability, underscoring its complementary role in value creation. Customer retention and customer loyalty emerged as the most influential relational capital components, highlighting the financial importance of long-term stakeholder relationships. This finding is consistent with prior research showing that stable customer relationships reduce transaction costs, increase repeat purchases, and enhance revenue predictability, thereby improving profitability [5, 23]. The strong ranking of customer feedback systems further suggests that relational capital contributes to profitability not only through market access but also by enabling organizational learning and continuous improvement. Studies conducted in banking and service industries similarly report that relational capital strengthens financial performance by fostering trust, reputation, and collaborative innovation [6, 25]. The relatively lower ranking of distribution channels and customer satisfaction may indicate that these elements are more context-dependent or operate as mediators rather than direct drivers of profitability.

Taken together, the findings support a systemic and integrated view of intellectual capital, in which human, structural, and relational dimensions interact to influence profitability outcomes. This integrated perspective is consistent with empirical evidence demonstrating nonlinear and interdependent relationships between intellectual capital components and firm performance [7]. The dominance of human capital does not diminish the importance of structural and relational capital; rather, it suggests that human capabilities are most effective when embedded within supportive organizational systems and external networks. The results also resonate with recent literature emphasizing the role of intellectual capital in fostering innovation, competitive advantage, and sustainability, particularly in dynamic and digitally transforming environments [12, 20]. By employing a mixed-methods approach, this study advances existing research by integrating expert judgment with quantitative validation, thereby offering a more context-sensitive and practically relevant model of intellectual capital and profitability.

The study has several limitations that should be acknowledged. First, although the sample size was statistically adequate, the data were collected within a specific organizational and institutional context, which may limit the generalizability of the findings to other countries or industries. Second, the reliance on self-reported questionnaire data introduces the possibility of response bias, particularly in the assessment of intangible constructs such as knowledge, skills, and relationships. Third, the cross-sectional design of the quantitative phase restricts the ability to draw causal inferences about the long-term effects of intellectual capital on profitability.

Future research can build on the present study in several ways. Longitudinal designs could be employed to examine how changes in intellectual capital components influence profitability over time. Comparative studies across industries, sectors, or national contexts would help to identify contextual moderators and enhance the external validity of the proposed model. Additionally, future research could integrate objective financial indicators with perceptual measures of intellectual capital to provide a more comprehensive assessment of performance outcomes.

From a practical perspective, the findings suggest several actionable implications for managers and policymakers. Organizations should prioritize investments in human capital development, particularly in leadership capability, knowledge sharing, and continuous learning. At the same time, attention should be given to strengthening structural capital through clear policies, efficient processes, and supportive technological infrastructure. Finally, organizations should actively manage relational capital by fostering long-term customer relationships and leveraging feedback mechanisms to enhance learning and innovation.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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