

EVALUATING ACCOUNTING MEASUREMENT PRACTICES FOR INTELLECTUAL CAPITAL IN IRAQI JOINT-STOCK COMPANIES: AN ANALYTICAL STUDY FOR THE PERIOD 2022–2024

Asst. Lect; Nergiz Tawfeeq Hasan, prof. Dr; Fazil Nabi Othman

1Department of Accounting, Technical Administrative College, Erbil Polytechnic University, Erbil, Iraq
nergiz.hasan@epu.edu.iq, fazilnabi@gmail.com

Received: 18/08/2026

Revised: 20/09/2026

Accepted: 25/10/2026

ABSTRACT:

This study evaluates accounting measurement practices for intellectual capital in Iraqi joint-stock companies by examining the suitability of the accounting models used to estimate its value and identifying the principal difficulties and limitations affecting their application. The study adopts a descriptive and analytical approach, drawing on the financial statements and annual reports of three Iraqi joint-stock companies: the Iraqi Company for the Production and Marketing of Meat and Field Crops, Al-Mansour Pharmaceutical Industries Company, and Baghdad Soft Drinks Company, for the period 2022–2024. To achieve its objectives, the study applies the market-to-book equity gap model (BTM) and the Calculated Intangible Value model (CIV), followed by an analytical comparison and an exploratory statistical test of the differences between the resulting estimates.

The findings reveal marked variation in estimated intellectual capital values, reflecting differences in the underlying bases and indicators of the measurement models. Baghdad Soft Drinks Company recorded the highest values under both models, whereas Al-Mansour Pharmaceutical Industries Company reported positive values under the market-to-book gap model and negative values under the CIV model throughout the study period. The Iraqi Company's CIV estimates also turned positive in 2024, confirming that the models respond differently to accounting and market indicators. The findings provide descriptive support for the research hypothesis, although the statistical evidence is insufficient to generalize the significance of the differences.

The study recommends adopting multiple, complementary measurement models, verifying the suitability of the assumptions and benchmark rates used, and developing accounting data and systems to improve the objectivity and comparability of intellectual capital measurement.

Keywords: *Intellectual Capital, Accounting Measurement, Market-To-Book Gap, Calculated Intangible Value, Iraqi Joint-Stock Companies.*

INTRODUCTION

The contemporary business environment has undergone rapid economic and knowledge-related changes that have altered the resources on which companies rely to achieve growth, maintain continuity, and strengthen their competitiveness. Physical assets and financial resources are no longer the sole basis for determining a company's value. Intellectual capital, encompassing knowledge, experience, human skills, organizational structures, and customer relationships, has become a strategic resource that contributes to value creation and future economic benefits. This shift has presented challenges for accounting thought, particularly in determining the value of intellectual resources and measuring them in accounting terms, given their intangible nature and the difficulty of objectively determining their costs and economic benefits.

In this context, the accounting measurement of intellectual capital warrants attention from accounting researchers and practitioners because traditional measurement methods do not adequately capture some of the knowledge resources held by companies, and because gaps may exist between their book and market values. These limitations have prompted the development of approaches and models that seek to estimate the value of intellectual capital or measure how efficiently it is employed. Such approaches support a more comprehensive understanding of the economic resources that create value, while distinguishing measurement for valuation and analysis from the accounting recognition of assets in financial statements.

Iraqi joint-stock companies face challenges in valuing their intellectual resources and identifying appropriate measurement methods, particularly as the business environment changes and accounting practices need to adapt to a knowledge-based economy. Accordingly, this study evaluates accounting measurement practices for intellectual capital in a sample of Iraqi joint-stock companies over 2022–2024. It examines the accounting bases and approaches used in measurement, analyzes the indicators and models that can be employed to estimate intellectual capital value, and identifies the difficulties that constrain objective measurement. The aim is to develop findings and recommendations that contribute to improving intellectual capital measurement practices in the Iraqi business environment.

RESEARCH METHODOLOGY

1-1 Research Problem

The shift toward a knowledge-based economy has increased the importance of intellectual capital as an economic resource that contributes to value creation and corporate competitiveness. This has challenged traditional accounting in determining and measuring its value, given its intangible nature and the difficulty of identifying its costs and future economic benefits. Although numerous accounting approaches and models have been proposed for measuring intellectual capital, their application faces difficulties concerning measurement objectivity, reliance on available financial data, and the limited accounting recognition of certain components. The research problem therefore concerns the need to evaluate accounting measurement practices for intellectual capital in Iraqi joint-stock companies, assess the suitability of methods and models currently used or potentially applicable to estimating its value, and identify the shortcomings that constrain objective measurement.

The research problem is expressed in the following main question:

How suitable are the practices and methods used for the accounting measurement of intellectual capital in Iraqi joint-stock companies, and what are the principal difficulties affecting their application?

The following subsidiary questions arise from this main question:

1. What accounting bases and approaches can be adopted to measure intellectual capital and its components?
2. To what extent can accounting measurement models for intellectual capital be applied using the financial data of the sampled companies for 2022–2024?
3. What are the principal difficulties and limitations affecting the accounting measurement of intellectual capital in the sampled companies?

1-2 Significance of the Study

The significance of this study stems from the growing reliance on intellectual capital as an intangible economic resource that contributes to value creation and corporate competitiveness. This reliance calls for accounting measurement methods suited to the nature and characteristics of these resources. The study's academic contribution lies in examining the accounting approaches and models used to measure intellectual capital and assessing their suitability for estimating its value in light of the limitations of traditional measurement methods. Its practical contribution lies in evaluating whether these models can be applied to the financial data of Iraqi joint-stock companies for 2022–2024 and identifying the difficulties involved. The resulting indicators may help company management and relevant stakeholders develop accounting measurement practices for intellectual resources.

1-3 Research Objectives

The study seeks to evaluate accounting measurement practices for intellectual capital in Iraqi joint-stock companies through the following objectives:

1. Identify the accounting bases and approaches used to measure intellectual capital and its components, and explain the principal models used to estimate its value.
2. Analyze the suitability of accounting measurement models for intellectual capital and the feasibility of applying them using the financial data of the sampled companies for 2022–2024.
3. Identify the principal difficulties and limitations affecting the accounting measurement of intellectual capital in the sampled companies, particularly those concerning data availability and measurement objectivity.
4. Develop findings and recommendations that contribute to improving accounting measurement practices for intellectual capital in a manner suited to the activities of Iraqi joint-stock companies.

1-4 Research Hypothesis

The study is based on the following main hypothesis:

The accounting measurement results for intellectual capital in the sampled Iraqi joint-stock companies during 2022–2024 vary according to differences in the bases and indicators of the accounting measurement models used to estimate its value .

1-5 Research Approach and Data Collection Methods

The study adopts a descriptive and analytical approach , which is appropriate for examining and evaluating accounting measurement practices for intellectual capital in Iraqi joint-stock companies . The descriptive approach addresses the concepts , theoretical foundations , and accounting approaches associated with intellectual capital measurement , drawing on relevant books , research , and academic studies . The analytical approach examines the sampled companies' financial data for 2022–2024 by analyzing their financial statements and annual reports , applying the intellectual capital measurement models supported by the available data , and comparing results across companies and years . This analysis aims to assess the suitability of these models and identify the difficulties and limitations associated with their application .

1-6 Scope of the Study

The scope of the study is defined as follows:

Organizational scope: The study covers three Iraqi joint-stock companies: the Iraqi Company for the Production and Marketing of Meat and Field Crops , Al-Mansour Pharmaceutical Industries Company , and Baghdad Soft Drinks Company . These companies were selected to evaluate accounting measurement practices for intellectual capital using their financial data .

Temporal scope: The study covers 2022–2024 , drawing on the financial statements , annual reports , and accounting records of the sampled companies for the years included in the analysis .

THEORETICAL FRAMEWORK

2-1 The Concept and Components of Intellectual Capital

Intellectual capital is a strategic intangible resource that has gained increasing importance with the shift toward a knowledge-based economy . It comprises the knowledge , experience , skills , organizational capabilities , and relationships that a company possesses or draws upon in conducting its activities and generating economic value . Bontis (2011: 42) defines it as the intellectual resources , knowledge , information , intellectual property , and experience that economic entities can use to create value . Bongiovanni and Cairns (2020: 142) , meanwhile , describe it as the knowledge , applied experience , organizational technology , customer relationships , and professional skills that provide an economic entity with a competitive advantage in the market .

Classifications of intellectual capital vary across the conceptual and accounting approaches that address it . However , the three-part classification is suitable for research and analysis , distinguishing the following components (Del Valle & Shepherd , 2023: 140–141):

Human Capital: The knowledge , skills , experience , competencies , and innovative capabilities possessed by employees that contribute to improving productivity , enhancing performance , and achieving the company's economic objectives .

Structural Capital: The organizational systems and procedures , databases , technology , intellectual property , and internal processes that support the company's activities and help preserve institutional knowledge and sustain its use .

Relational Capital: The relationships linking the company to its customers , suppliers , partners , and other external parties , together with its business reputation , customer loyalty , and market relationships that support its competitiveness .

Intellectual capital thus represents an integrated system of knowledge , organizational , and relational resources that contribute to a company's economic value . However , the intangible nature and differing characteristics of these resources create challenges in determining their value and measuring them in accounting terms .

Measurement therefore requires approaches and models suited to the nature of each component and to the financial data available .

2-2 Accounting Measurement of Intellectual Capital and Its Importance

The accounting measurement of intellectual capital is a contemporary approach to determining the economic value of the knowledge-based and intangible resources held by companies . It uses quantitative methods and indicators to estimate their value and explain their contribution to generating economic benefits . Ali and Anwar (2021: 35) define it as the process of identifying and valuing intangible assets , including knowledge , skills , relationships , and innovative ideas that create additional value and provide a competitive advantage . Bamel et al . (2022: 379) view it as a process intended to reveal the economic value of intangible resources , particularly knowledge , experience , and relationships that can be employed to achieve competitive superiority .

The importance of accounting measurement of intellectual capital lies in its capacity to provide indicators for assessing intellectual resources that traditional financial statements do not adequately reflect . It also supports managerial and investment decisions and the assessment of efficiency in using knowledge resources . Its principal benefits can be identified as follows (Garanina et al . , 2021: 145):

1. Assessing intellectual resources: Determining the economic value of knowledge resources , skills , and organizational experience , and identifying strengths and weaknesses in their utilization .
2. Supporting managerial and investment decisions: Providing quantitative indicators that help direct investment toward training , research and development , and technology in line with the company's objectives .
3. Improving performance evaluation: Linking intellectual resources to financial and operational performance indicators and determining their contribution to value added and productivity improvements .
4. Strengthening competitiveness: Helping companies identify sources of knowledge and innovation and develop organizational capabilities that support their continuity and competitive position .

Accordingly , the accounting measurement of intellectual capital extends beyond estimating the value of intangible resources to assessing how efficiently they are employed . This requires objective , applicable measurement models based on financial data that can be verified and compared across companies and accounting periods .

2-3 Accounting Measurement Methods and Models for Intellectual Capital

Various methods and models have been developed to measure intellectual capital in accounting terms , reflecting the different characteristics of its components and the difficulty of directly determining their economic value . Some methods estimate the returns generated by intellectual resources , while others rely on financial and non-financial indicators or the gap between a company's market and book values . The principal approaches are outlined below:

1. Exclusion Approach: This approach identifies returns attributable to intellectual capital by deducting the expected returns on tangible and financial assets from total returns . A prominent example is the Calculated Intangible Value model (CIV) , which uses excess returns to estimate the value of intangible resources (Najm , 2014: 16) .
2. Multiple Indicators Approach: This approach uses a set of financial and non-financial indicators reflecting the components of intellectual capital , such as employee efficiency , expenditure on training and research and development , and customer relationships . The Edvinsson and Malone model is among the principal models used in this field (Al-Arbeed , 2014: 13–14) .
3. Cost Models Approach: This approach estimates intellectual capital using the costs associated with creating and developing knowledge resources , particularly investment in human resources , training , and skills development . However , the historical cost of these resources does not necessarily reflect their actual economic value (Al-Arbeed , 2014: 15) .
4. Outcome-Based Approach: This approach measures the economic and organizational outcomes of using knowledge rather than knowledge itself , given the difficulty of assigning a direct value to intellectual resources and their intangible nature (Al-Arbeed , 2014: 15–16) .
5. Knowledge-Based Value Approach: This approach focuses on the relationship between knowledge resources and the economic value generated . A prominent example is the market-to-book value model , which compares a company's market value with its book value . The difference is treated as a potential

indicator of intangible resources that do not appear in accounting records , while recognizing that this difference may also be influenced by factors other than intellectual capital (Obaid , 2020: 92–93) .

Alongside these approaches , the Value Added Intellectual Coefficient model (VAIC) measures the efficiency with which human resources , structural resources , and capital employed generate value added . These models differ in the data they require and the way results are calculated . The choice of an appropriate model therefore depends on the company's activities and the availability , analyzability , and comparability of its financial data . Evaluating accounting measurement practices for intellectual capital thus requires both an understanding of the theoretical foundations of these models and an analysis of their suitability for application , with due regard to each model's limitations in objectively representing the economic value of intellectual resources .

2-4 Limitations and Difficulties in the Accounting Measurement of Intellectual Capital

Despite advances in accounting measurement methods and models for intellectual capital , their application faces difficulties and limitations arising from the intangible nature and varied components of intellectual resources , as well as differences in the bases and criteria used to estimate their value . Makhoulf (2022: 26) notes that , despite the quantitative and descriptive indicators these models provide , they remain subject to limitations affecting the accuracy and comparability of their results . The principal limitations are as follows (Najm , 2014: 18–20):

1. Difficulty of monetary valuation: An objective monetary value cannot readily be assigned to certain components of intellectual capital , particularly knowledge , experience , skills , and organizational relationships , because of their intangible nature and the difficulty of identifying the associated economic benefits .
2. Limited coverage of measurement models: Some models focus on particular components , such as patents and trademarks , while struggling to measure others , including accumulated experience , tacit knowledge , and customer relationships .
3. Sensitivity to market factors: Some models rely on the difference between a company's market and book values . However , this difference is influenced by multiple economic and financial factors , making it difficult to attribute it entirely to intellectual capital .
4. Difficulties of comparison and objectivity: Some methods rely on descriptive indicators and subjective estimates , while quantitative models provide aggregate results that may not reveal the actual contribution of each component of intellectual capital .
5. Limited accounting data: Measurement requires detailed data on human resources , research and development , innovation , and market relationships . Failure to report these items separately in accounting records and financial reports may make measurement models difficult to apply accurately .

EMPIRICAL STUDY

3-1 Profile of the Sampled Companies and the Data Used in the Analysis

The study covers three Iraqi joint-stock companies listed on the Iraq Stock Exchange whose production and industrial activities differ , allowing accounting measurement practices for intellectual capital to be evaluated across varied operating environments . The companies were selected on the basis of their activities and the feasibility of analyzing their financial data for 2022–2024 . They are described below:

1. Iraqi Company for the Production and Marketing of Meat and Field Crops: Established in 1987 , this mixed-ownership joint-stock company produces and markets meat , field crops , and agricultural and food products . The relevance of studying its intellectual capital lies in the human expertise , organizational capabilities , and relationships associated with its production and marketing activities .
2. Al-Mansour Pharmaceutical Industries Company: Established in 1989 , the company specializes in producing medicines , medical supplies , cosmetics , and sterile water . Its activities depend on technical expertise , specialized knowledge , production processes , and research and development , making it suitable for studying indicators of human and structural capital .
3. Baghdad Soft Drinks Company: Established in 1989 , the company produces and markets soft drinks and operates under franchise agreements with PepsiCo . Trademarks , marketing relationships , and technological processes are central to its activities and are associated with relational and structural capital .

The analysis draws on the sampled companies' financial statements , annual reports , and accounting records for 2022–2024 , including data on assets , equity , financial results , and expenses associated with intellectual capital components , together with the market share-price data needed to apply the measurement models . The analysis

focuses on the Book-to-Market (BTM) and Calculated Intangible Value (CIV) models to evaluate intellectual capital measurement results and compare them across the companies and years covered by the study .

3-2 Presentation and Analysis of the Financial Data Used to Measure Intellectual Capital

Evaluating the accounting measurement of intellectual capital requires identifying the financial values on which the measurement models are based , particularly the market and book values of equity . Comparing these values reveals the size of the market-to-book gap and its development over the study period as an indirect analytical indicator of intangible resources . Table (2) presents the values used for the sampled companies for 2022–2024 .

Table (1) Market and Book Values of Equity in the Sampled Companies for 2022–2024

Company	Year	Market value	Book value
Iraqi Company for the Production and Marketing of Meat and Field Crops	2022	34 ,250 .000	10 ,419 .494
	2023	38 ,500 .000	10 ,733 .231
	2024	28 ,500 .000	13 ,134 .959
Al-Mansour Pharmaceutical Industries	2022	16 ,486 .432	15 ,856 .609
	2023	19 ,057 .282	16 ,519 .536
	2024	20 ,973 .087	17 ,179 .121
Baghdad Soft Drinks	2022	674 ,306 .600	496 ,451 .522
	2023	792 ,821 .093	558 ,951 .780
	2024	845 ,948 .280	628 ,379 .163

Source: Prepared by the researcher using the financial statements , annual reports , and market value data of the sampled companies for 2022–2024 .

Table (2) shows differing trends in market and book values across the sampled companies . The Iraqi Company's market value increased in 2023 and then declined in 2024 , despite continued growth in the book value of equity , indicating that the gap narrowed in the final year . Al-Mansour Pharmaceutical Industries Company recorded sustained increases in both values , with market value growing faster than book value . Baghdad Soft Drinks Company recorded the highest market and book values in all three years . These differences provide an important basis for evaluating measurement results derived from the market-to-book gap .

3-3 Application of the Market-to-Book Equity Gap Model

This model calculates the difference between the market and book values of equity as an approximate indicator of value not reflected in accounting records , while recognizing that the difference may include the effects of factors other than intellectual capital . The following equations were used in its application:

Estimated gap value = Market value of equity – Book value of equity

Market-to-book ratio = Market value ÷ Book value

Gap-to-market value ratio = (Gap ÷ Market value) × 100

Table (2) Market-to-Book Gap Measurement Results and Analytical Ratios for 2022–2024

Company	Year	Gap value (million dinars)	Market / book (times)	Gap / market value (%)
Iraqi	2022	23 ,830 .506	3 .29	69 .58
	2023	27 ,766 .769	3 .59	72 .12
	2024	15 ,365 .041	2 .17	53 .91
Al-Mansour	2022	629 .823	1 .04	3 .82
	2023	2 ,537 .746	1 .15	13 .32
	2024	3 ,793 .966	1 .22	18 .09
Baghdad	2022	177 ,855 .078	1 .36	26 .38
	2023	233 ,869 .313	1 .42	29 .50
	2024	217 ,569 .117	1 .35	25 .72

Source: Prepared by the researcher by applying the measurement equations to the data presented in Table (2) . The results in Table (3) show variation in the size of the market-to-book gap and its proportion of market value across the sampled companies . The Iraqi Company recorded the highest gap-to-market value ratio in 2023 , at 72 .12% , before it declined to 53 .91% in 2024 , reflecting a reduction in the gap's relative weight in the market

valuation of the company . In contrast , Al-Mansour's ratio rose steadily from 3 .82% in 2022 to 18 .09% in 2024 , indicating a widening gap between market valuation and recorded equity . Baghdad retained the largest absolute gap among the three companies , amounting to 217 ,569 .117 million dinars in 2024 , although its proportion of market value declined compared with 2023 .

These results show that market valuation does not coincide with the book value of equity and that the degree of difference varies by company and financial year . The analysis therefore needs to be extended using the Calculated Intangible Value model (CIV) to identify indicators based on economic returns and compare them with indicators based on market valuation .

3-4 Application of the Calculated Intangible Value Model (CIV) to the Sampled Companies

The Calculated Intangible Value model (CIV) is a quantitative method for estimating the economic value of intangible resources . It identifies the excess return a company earns relative to a benchmark return on assets . The model assumes that returns exceeding the benchmark may indicate that intellectual , organizational , and relational resources contribute to generating additional economic value .

To apply the model to the sampled companies for 2022–2024 , income before tax and asset data were obtained from their financial statements . Return on assets was then calculated and compared with a benchmark of 5% , the rate adopted in the empirical calculations . A discount rate of 10% was also used to convert tax-adjusted excess returns into an estimated value .

3- 4-1 Analysis of Income Before Tax , Assets , and Return on Assets

Income before tax and asset data form the basis of the CIV model . Return on assets is calculated by dividing income before tax by total assets and multiplying the result by 100 . Table (3) presents the financial indicators used to apply the model to the sampled companies .

Table (3) Income Before Tax , Assets , and Return on Assets of the Sampled Companies for 2022–2024

Company	Year	Income before tax	Assets	Return on assets (%)
Iraqi Company	2022	493 .132	12 ,913 .098	3 .82
	2023	373 .595	12 ,927 .526	2 .89
	2024	1 ,023 .398	15 ,417 .095	6 .64
Al-Mansour Pharmaceutical Industries	2022	(799 .721)	21 ,712 .655	(3 .68)
	2023	46 .106	21 ,965 .267	0 .21
	2024	775 .983	23 ,297 .032	3 .33
Baghdad Soft Drinks	2022	60 ,660 .682	559 ,513 .197	10 .84
	2023	115 ,370 .072	642 ,617 .206	17 .95
	2024	170 ,689 .717	716 ,127 .337	23 .83

Source: Prepared by the researcher using the financial data employed in applying the CIV model to the sampled companies for 2022–2024.

Table (3) shows differences in income before tax , assets , and returns on assets across the sampled companies . The Iraqi Company for the Production and Marketing of Meat and Field Crops recorded a decline in return on assets from 3 .82% in 2022 to 2 .89% in 2023 , followed by an increase to 6 .64% in 2024 . This exceeded the 5% benchmark adopted in the application , indicating an improved ability to generate excess returns in the final year .

Al-Mansour Pharmaceutical Industries Company recorded a negative return on assets of 3 .68% in 2022 as a result of the loss incurred that year . The return turned positive at 0 .21% in 2023 and then rose to 3 .33% in 2024 . Despite this improvement , it remained below the adopted benchmark , indicating that the company continued to generate no positive excess returns under the assumptions of the CIV model .

By contrast , Baghdad Soft Drinks Company recorded a sustained increase in return on assets , from 10 .84% in 2022 to 17 .95% in 2023 and 23 .83% in 2024 . This reflects the company's ability to generate returns above the adopted benchmark throughout the study period , which is expected to produce positive calculated intangible values .

These results indicate that differences in returns on assets across the sampled companies provide an important basis for explaining variation in intellectual capital estimates under the CIV model , particularly because excess return is the principal input in calculating the estimated value of intangible resources .

3-4-2 Calculation of Excess Returns and Calculated Intangible Value under the CIV Model

After determining income before tax , assets , and returns on assets for the sampled companies , the next step is to calculate excess returns , which provide the quantitative basis for the CIV model . Excess return is determined by comparing actual income before tax with the benchmark return calculated on assets . It is then adjusted according to the tax treatment adopted in the application , and a capitalization rate is used to estimate intangible value .

For the empirical application , a benchmark return of 5% and a capitalization rate of 10% were adopted in accordance with the assumptions used in the calculations , based on the following equations:

$$\begin{aligned}\text{Excess return} &= \text{Income before tax} - (\text{Assets} \times \text{Benchmark rate of return}) \\ \text{Net excess return} &= \text{Excess return} \times (1 - \text{Adopted tax rate}) \\ \text{Calculated Intangible Value (CIV)} &= \text{Net excess return} \div \text{Capitalization rate}\end{aligned}$$

Table (4) presents the calculated excess returns and intangible values for the sampled companies during 2022–2024 .

Table (4) Excess Returns and Calculated Intangible Values of the Sampled Companies for 2022–2024
Unit: Million Iraqi dinars , except for the tax rate .

Company	Year	Excess return before tax	Adopted tax rate (%)	Net excess return	CIV value
Iraqi	2022	(152 .522)	0	(152 .522)	(1 ,525 .224)
	2023	(272 .782)	0	(272 .782)	(2 ,727 .815)
	2024	252 .543	0	252 .543	2 ,525 .429
Al-Mansour	2022	(1 ,885 .354)	0	(1 ,885 .354)	(18 ,853 .536)
	2023	(1 ,052 .157)	0	(1 ,052 .157)	(10 ,521 .572)
	2024	(388 .869)	0	(388 .869)	(3 ,888 .689)
Baghdad	2022	32 ,684 .022	5	31 ,049 .821	310 ,498 .213
	2023	83 ,239 .212	5	79 ,077 .252	790 ,772 .515
	2024	134 ,783 .350	5	128 ,044 .183	1 ,280 ,441 .828

Source: Prepared by the researcher using the CIV model results presented in the financial data of the sampled companies for 2022–2024 , with amounts expressed in millions of dinars .

Table (4) shows differences in excess returns and calculated intangible values across the sampled companies . The Iraqi Company for the Production and Marketing of Meat and Field Crops recorded negative excess returns of 152 .522 and 272 .782 million dinars in 2022 and 2023 , respectively , resulting in negative CIV estimates . In 2024 , however , excess return turned positive at 252 .543 million dinars , producing a calculated intangible value of 2 ,525 .429 million dinars . This indicates improved performance relative to the adopted benchmark rate of return .

Al-Mansour Pharmaceutical Industries Company's measurement results show negative excess returns throughout the study period . The negative amount was 1 ,885 .354 million dinars in 2022 , narrowing to 1 ,052 .157 million dinars in 2023 and 388 .869 million dinars in 2024 . This development was reflected in an improvement in the CIV estimate from negative 18 ,853 .536 million dinars in 2022 to negative 3 ,888 .689 million dinars in 2024 . The gap between actual and benchmark returns therefore narrowed , although no positive excess return was achieved during the three years .

Baghdad Soft Drinks Company recorded positive and increasing excess returns over the study period . According to the calculations presented , these rose from 32 ,684 .022 million dinars in 2022 to 134 ,783 .350 million dinars in 2024 , increasing calculated intangible value from 310 ,498 .213 million dinars to 1 ,280 ,441 .828 million dinars over the same period . These results demonstrate the company's ability to generate returns above the

benchmark used in the model , although this does not mean that the entire excess return can be attributed solely to intellectual capital .

The preceding results show that the CIV model yields estimates different from those produced by the market-to-book gap model because it relies on accounting returns rather than market valuation . This difference underscores the importance of comparing the two models to determine how measurement results are affected by the accounting and financial indicators used .

3-5 Analytical Comparison of Intellectual Capital Measurement Results under the BTM and CIV Models

Once intellectual capital had been measured in the sampled companies using the market-to-book gap model (BTM) and the Calculated Intangible Value model (CIV) , the resulting estimates were compared analytically to identify similarities and differences in their values and trends over 2022–2024 . This comparison is important because the two models rest on different bases: the first reflects the gap between the market valuation and accounting value of equity , while the second relies on excess economic returns relative to a benchmark return on assets .

To establish the extent of variation between the results , the arithmetic difference between the two estimates was calculated by subtracting BTM from CIV . Table (5) presents the comparison for the three companies .

Table (5) Comparison of Intellectual Capital Measurement Results under the BTM and CIV Models for 2022–2024

Company	Year	BTM value	CIV value	Difference between estimates (CIV – BTM)
Iraqi Company	2022	23 ,830 .506	(1 ,525 .224)	(25 ,355 .731)
	2023	27 ,766 .769	(2 ,727 .815)	(30 ,494 .584)
	2024	15 ,365 .041	2 ,525 .429	(12 ,839 .611)
Al-Mansour Company	2022	629 .823	(18 ,853 .536)	(19 ,483 .359)
	2023	2 ,537 .746	(10 ,521 .572)	(13 ,059 .317)
	2024	3 ,793 .966	(3 ,888 .689)	(7 ,682 .655)
Baghdad Company	2022	177 ,855 .078	310 ,498 .213	132 ,643 .135
	2023	233 ,869 .313	790 ,772 .515	556 ,903 .202
	2024	217 ,569 .117	1 ,280 ,441 .828	1 ,062 ,872 .711

Source: Prepared by the researcher using the results of applying the two accounting measurement models for intellectual capital to the sampled companies for 2022–2024 .

Table (5) shows variation in intellectual capital measurement results across the sampled companies , as well as differences in the magnitude and direction of the gap between the estimates over the study period . These results can be analyzed as follows:

1) First: Iraqi Company for the Production and Marketing of Meat and Field Crops

The measurement results reveal a clear difference between the two models . The BTM model recorded positive values in all three years , peaking at 27 ,766 .769 million dinars in 2023 . The CIV model , meanwhile , recorded negative values in 2022 and 2023 before turning positive at 2 ,525 .429 million dinars in 2024 . Consequently , the negative difference between the estimates narrowed from 30 ,494 .584 million dinars in 2023 to 12 ,839 .611 million dinars in 2024 . This indicates that the improvement in excess return in the final year was not accompanied by a corresponding increase in the market-to-book gap , illustrating how the measurement indicators respond differently to financial and market changes .

2) Second: Al-Mansour Pharmaceutical Industries Company

The company's results reveal two different measurement trends . The BTM estimate rose from 629 .823 million dinars in 2022 to 3 ,793 .966 million dinars in 2024 , whereas CIV estimates remained negative throughout the study period , although their negative magnitude narrowed from 18 ,853 .536 million dinars to 3 ,888 .689 million dinars . As a result , the negative difference between the estimates decreased from 19 ,483 .359 million dinars in 2022 to 7 ,682 .655 million dinars in 2024 . This development reflects improvements in both relative market valuation and operating returns compared with previous years , while positive excess returns remained absent under the benchmark adopted in the CIV model .

3) Third: Baghdad Soft Drinks Company

The company recorded the highest estimated intellectual capital values among the sampled companies under both models , although the difference between the measurement results was substantial and increased over time . The BTM estimate was approximately 177 ,855 .078 million dinars in 2022 , increased to 233 ,869 .313 million dinars in 2023 , and then declined to 217 ,569 .117 million dinars in 2024 . By contrast , CIV estimates increased continuously from 310 ,498 .213 million dinars to 1 ,280 ,441 .828 million dinars over the same period . The positive difference between the estimates consequently widened from 132 ,643 .135 million dinars in 2022 to 1 ,062 ,872 .711 million dinars in 2024 .

This variation arises from the different measurement bases . The BTM model is linked to the market and book values of equity , whereas the CIV model is influenced by accounting income , assets , the benchmark rate of return , and the capitalization rate . A CIV estimate exceeding the BTM estimate therefore does not necessarily mean that one model is more accurate than the other; it reflects differences in the assumptions and limitations affecting their results .

Overall , the analytical comparison confirms variation in the accounting measurement results for intellectual capital in the sampled Iraqi joint-stock companies . The estimates produced by the two models did not coincide in any of the study years . This suggests that reliance on a single measurement approach may provide only a partial indication of intellectual capital value . The accounting and financial bases of each model and the limits of its applicability should therefore be considered when interpreting results and comparing companies .

3-6 Testing the Research Hypothesis and Discussing the Statistical Results

After presenting and analyzing the accounting measurement results for intellectual capital under the BTM and CIV models , the study proceeded to test the following research hypothesis:

The accounting measurement results for intellectual capital in the sampled Iraqi joint-stock companies during 2022–2024 vary according to differences in the bases and indicators of the accounting measurement models used to estimate its value .

To assess the differences between the two models , an exploratory paired-samples t-test was used to compare the values produced by each model for the same company over the three years . This test is more closely aligned with the hypothesis than a one-sample t-test because it examines the difference between two related estimates rather than comparing the mean of each estimate with zero .

The difference between the two models was calculated using the following equation:

$$\text{Difference between estimates} = \text{CIV value} - \text{BTM value}$$

The test statistic was then calculated using the following equation:

$$t = \frac{\bar{D}}{S_D \sqrt{n}}$$

Here , $\bar{D}$ denotes the arithmetic mean of the differences between the BTM and CIV results , S_D denotes the standard deviation of these differences , and n denotes the number of observations , comprising three years for each company during 2022–2024 . This equation was used to test the significance of the mean difference between the two models . Table (6) presents the statistical test results for the sampled companies .

Table (6) Paired-Samples t-Test Results for Differences between the BTM and CIV Models in the Sampled Companies for 2022–2024

Company	Mean BTM	Mean CIV	Mean difference	Standard deviation of differences	t-value	p-value
Iraqi Company	22 ,320 .772	(575 .870)	(22 ,896 .642)	9 ,080 .741	-4 .367	0 .0486
Al-Mansour Company	2 ,320 .511	(11 ,087 .932)	(13 ,408 .444)	5 ,908 .094	-3 .931	0 .0590
Baghdad Company	209 ,764 .503	793 ,904 .185	584 ,139 .683	465 ,712 .503	2 .172	0 .1619

Source: Prepared by the researcher using the intellectual capital measurement results for 2022–2024 and recalculating the paired-samples t-test .

Note: Each company has 3 observations and 2 degrees of freedom . The nominal significance level is 0 .05 . Values in parentheses are negative .

Table (6) shows variation in the mean accounting measurement results for intellectual capital under the BTM and CIV models across the sampled companies . The Iraqi Company recorded a negative mean difference of 22 ,896 .642 million dinars , a calculated t-statistic of -4.367 , and a p-value of 0 .0486 . This is below the nominal significance level of 0 .05 , indicating a nominally statistically significant difference between the means of the two models for this company .

For Al-Mansour Pharmaceutical Industries Company , the mean difference between the two models was negative 13 ,408 .444 million dinars , with a calculated t-statistic of -3.931 and a p-value of 0 .0590 . This exceeds the adopted significance level , indicating that the difference is not statistically significant despite the clear variation in the accounting estimates .

For Baghdad Soft Drinks Company , the positive mean difference between the two models was 584 ,139 .683 million dinars , with a calculated t-statistic of 2.172 and a p-value of 0 .1619 . This exceeds the 0 .05 significance level , indicating that the difference is not statistically significant despite the higher estimates produced by CIV relative to BTM .

The results indicate that differences in accounting measurement bases lead to variation in intellectual capital estimates . However , this variation did not reach nominal statistical significance in all companies . Given the limited number of observations—three years per company—and the use of three separate tests , the results should be interpreted cautiously . None remains statistically significant when the significance level is adjusted to 0 .0167 for multiple testing .

These findings provide descriptive and analytical support for the research hypothesis: the data show that estimated intellectual capital values vary with the bases and indicators of the two measurement models . However , the statistical tests do not provide sufficient evidence to generalize the significance of these differences across the sampled companies collectively . The findings therefore support the hypothesis analytically , while the statistical evidence remains insufficient to establish significant differences in general .

CONCLUSIONS AND RECOMMENDATIONS

4-1 Conclusions

The theoretical framework and the empirical analysis of accounting measurement practices for intellectual capital in the sampled Iraqi joint-stock companies during 2022–2024 yield several conclusions . These reflect the nature of the accounting approaches used , the extent to which their results differ , and the limitations affecting their application , as follows:

First: Theoretical Conclusions

- 1 . Intellectual capital is an intangible economic resource comprising interrelated human , structural , and relational components . Its accounting measurement is difficult because these components differ in nature and cannot all be expressed in objective monetary values , limiting the capacity of traditional accounting measures to estimate its value comprehensively .
- 2 . Accounting measurement methods for intellectual capital differ in their underlying bases and indicators . Some models rely on the market-to-book gap , while others use excess economic returns , costs , or financial and non-financial indicators . Estimated results therefore vary according to the model used .
- 3 . The difference between the market and book values of equity is neither a direct nor a comprehensive measure of intellectual capital because it is influenced by numerous market and financial factors . Similarly , the excess returns used in the CIV model cannot be attributed entirely to intellectual resources without considering other factors affecting performance .
- 4 . Accounting measurement models for intellectual capital are analytical tools that help estimate aspects of its economic value . Their use does not necessarily mean that the resulting values can be recognized as separate assets in financial statements . Economic valuation must therefore be distinguished from accounting recognition under the applicable requirements .

4) Second: Empirical Conclusions

- 1 . The market-to-book gap model produced positive values for all three companies throughout 2022–2024 , with clear differences in their magnitude and trends . Baghdad Soft Drinks Company recorded the largest absolute gap , while the Iraqi Company for the Production and Marketing of Meat and Field Crops recorded the highest gap-to-market value ratio over the study period .
- 2 . The CIV results show that Baghdad Soft Drinks Company generated positive and increasing excess returns during all three study years , leading to a higher estimated value under the model . Al-Mansour Pharmaceutical Industries Company , by contrast , recorded negative values throughout the period despite gradual improvements in returns on assets and a narrowing gap relative to the benchmark used .
- 3 . The Iraqi Company for the Production and Marketing of Meat and Field Crops showed differing directions in its measurement results . Market-to-book gap values remained positive throughout the study period , while CIV estimates moved from negative values in 2022 and 2023 to a positive value in 2024 . This confirms that differences in measurement bases can produce divergent trends even within the same company .
- 4 . The comparison reveals substantial differences in estimated intellectual capital values between the two models for all companies and years covered by the study . Measurement results are therefore affected by the financial data used and the assumptions adopted , particularly the benchmark return , the capitalization rate , and the market valuation of equity .
- 5 . The descriptive and analytical comparison supports the hypothesis that accounting measurement results for intellectual capital vary with the bases and indicators of the models used . However , the exploratory statistical test does not provide sufficient evidence to establish the significance of these differences in general , given the limited number of observations and the differing significance levels across companies .
- 6 . The empirical application shows that using more than one model provides different indicators that can inform the evaluation of intellectual capital . However , the accuracy of these estimates remains dependent on the integrity of the financial data , the suitability of the assumptions , and comparability across companies . Calculation inputs should therefore be verified before the results are used in accounting valuation .

4-2 Recommendations

In light of the study's conclusions on accounting measurement practices for intellectual capital in Iraqi joint-stock companies during 2022–2024 , and the variation in estimated values and limitations in calculation bases revealed by the two models , the following recommendations are proposed:

- 1 . Develop accounting measurement methods for intellectual capital in Iraqi joint-stock companies by adopting quantitative and analytical approaches suited to their economic activities and available financial data . This would help estimate the intangible aspects of intellectual resources more objectively and comparably .
- 2 . Use more than one model when valuing intellectual capital rather than relying solely on either the market-to-book gap or excess economic returns , given the clear differences observed between BTM and CIV estimates . Each model's results should be interpreted in light of its underlying bases and assumptions .
- 3 . Develop information systems and accounting records in the sampled companies so that expenditure on training , skills development , research and development , innovation , technology , and marketing relationships can be identified separately . This would provide an information base supporting the application of intellectual capital measurement models , while observing the accounting recognition criteria for intangible assets .
- 4 . Verify the suitability of the rates and assumptions used in the CIV model , particularly the benchmark return on assets , the capitalization rate , and tax treatment . Rates should be grounded in reliable sectoral and financial data appropriate to each company's activities to limit the influence of unsupported assumptions on the resulting estimates .
- 5 . Improve the accuracy of data used in the accounting measurement of intellectual capital by reconciling market values with share prices and the number of issued shares at the measurement date , verifying equity , income before tax , and assets against the financial statements , and rechecking the calculation formulas before using the results to value intellectual resources .
- 6 . Encourage professional accounting and regulatory bodies in Iraq to consider developing practical guidelines for intellectual capital measurement . These should specify appropriate indicators and methods for calculating and interpreting them , taking account of the accounting system used by Iraqi companies and distinguishing analytical estimates of intellectual capital value from asset recognition under the relevant standards .
- 7 . Develop the capabilities of accounting and finance personnel in Iraqi joint-stock companies through specialized training in intellectual capital measurement , intangible resource analysis , and the application of quantitative models . This would help build the skills required to extract financial data and interpret measurement indicators on a sound scientific basis .
- 8 . Extend future empirical studies of intellectual capital measurement by increasing the number of companies and years analyzed , applying additional models such as the Value Added Intellectual Coefficient (VAIC) ,

and conducting sensitivity tests for rates of return and capitalization . This would allow researchers to assess the stability of estimates and compare the efficiency of the models used in the Iraqi economic environment .

REFERENCES

1. Iraqi Company for the Production and Marketing of Meat and Field Crops . (2022–2024) . Annual reports , financial statements , and final accounts for the years covered by the study .
2. Al-Mansour Pharmaceutical Industries Company . (2022–2024) . Annual reports , financial statements , and final accounts for the years covered by the study .
3. Baghdad Soft Drinks Company . (2022–2024) . Annual reports , financial statements , and final accounts for the years covered by the study .
4. Iraq Stock Exchange . (2022–2024) . Share trading data and closing prices for the sampled companies during the study period .
5. Najm , Najm Aboud . (2014) . Evaluating and measuring knowledge work productivity in specialized and knowledge-based companies . Paper presented at the Fourth Annual International Scientific Conference , Faculty of Economics and Administrative Sciences , Al-Zaytoonah University , Jordan .
6. Al-Arbeed , Issam Fahd . (2014) . Measuring intellectual capital between theory and practice . Paper presented at the Fourth Annual International Scientific Conference , Faculty of Economics and Administrative Sciences , Al-Zaytoonah University , Jordan .
7. Obaid , Nagham Hussein . (2020) . The impact of investment in intellectual capital on organizational performance: A field study . Master's thesis in Business Administration , College of Administration and Economics , University of Baghdad .
8. Aliwi , Abbas Asaeed , & Al-Shammari , Bushra Kadhim Salman . (2020) . Accounting measurement and disclosure of intellectual capital using accounting models at the Iraqi Insurance Company . Journal of Accounting and Financial Studies , University of Baghdad , 15(53) , 123–143 .
9. Bontis , Nick , (2011) , “Assessing Knowledge Assets” : A review of the models used to measure intellectual capital .
10. Garanina , T . , Hussinki , H . , & Dumay , J . (2021) . Accounting for intangibles and intellectual capital: A literature review from 2000 to 2020 . Accounting & Finance , 61(4) , 5111–5140 . <https://doi.org/10.1111/acfi.12751> .
11. Ali , B . J . , & Anwar , G . (2021) . Intellectual capital: A modern model to measure the value creation in a business . International Journal of Engineering , Business and Management , 5(2) , 31–43 . <https://doi.org/10.22161/ijebm.5.2.4> .
12. Bamel , U . , Pereira , V . , Del Giudice , M . , & Temouri , Y . (2022) . The extent and impact of intellectual capital research: A two-decade analysis . Journal of Intellectual Capital , 23(2) , 375–400 . <https://doi.org/10.1108/JIC-05-2020-0142> .
13. Bongiovanni , I . , Renaud , K . , & Cairns , G . (2020) . Securing intellectual capital: An exploratory study in Australian universities . Journal of Intellectual Capital , 21(3) , 481–505 . <https://doi.org/10.1108/JIC-08-2019-0197> .

14. Bontis , N . (1998) . Intellectual capital: An exploratory study that develops measures and models . Management Decision , 36(2) , 63–76 . <https://doi.org/10.1108/00251749810204142>
15. Del Valle , F . , & Shepherd , N . A . (2021) . Making intangibles visible: Understanding and reporting the financial impact of intangibles and building a bridge between accounting , integrated reporting and sustainability . Mundo Contable , 1(1) .