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The Relationship between Intellectual Capital and Non-Performing Loans of Banks Listed on the Tehran Stock Exchange

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Abstract

A combination of financial and non-financial information influences investor decisions in the capital market. However, the reports companies release to the capital market often focus on financial aspects and provide little information about intangible assets. Therefore, in addition to conventional financial information, investors need more data about intangible factors that affect stock prices. Intellectual Capital (IC) is one of these intangible factors. The main objective of this study is to examine the relationship between IC and the asset quality of banks listed on the Tehran Stock Exchange. For this purpose, data from banks over 19 years (2004-2022) were analyzed, and 14 banks were selected. To test the research hypotheses, a multivariate regression approach based on the asymmetric panel-data analysis method was employed in EViews. The results indicate a significant relationship between IC (i.e., banks' value-added coefficient) and Non-Performing Loans (NPLs). Furthermore, both Human Capital Efficiency (HCE) and employed capital efficiency are positively and significantly related to banks' NPLs.

Keywords: Intellectual capital, Non-performing loans, Value-added coefficient.

1 | Introduction

Before the current technological era, significant attention was given to tangible productive resources as the key drivers of value creation. Today, there is a growing interest in intangible assets, including Intellectual Capital (IC), in the business environment. It has now become a cliché that intangible elements are central to value creation [1]. In other words, the knowledge-based economy comprises two components: knowledge-based products and knowledge-based innovation, where the source of innovation is IC. Accordingly, the

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focus of most theorists has shifted from physical capital to IC. Likewise, business institutions have increased their focus on managing a knowledge-based economy. As the global economy expands, enhancing competitive advantage is key to achieving future market share. Effective management of IC not only creates value for the business unit but also improves its competitive advantage [2]. Therefore, in recent times, successful companies have focused on leveraging intangible assets such as technology, knowledge, and employees' skills [1]. Willoughby [3] reiterates this point, concluding that companies' financial performance is often derived from the accumulation of strong intellectual features, such as trademarks and patents. For instance, in the banking industry, Alhassan and Asare [4] noted that the IC values of banks in emerging countries are primarily driven by investment in human capital, which serves as a key basis for gaining a competitive advantage.

Despite the importance of IC, there is no consensus in the existing literature on its definition. However, most authors generally acknowledge that IC is broad and comprises three main components: human capital (training, job-related knowledge, competencies, etc.), Structural Capital (SC) (information systems, patents, copyrights, etc.), and relational capital (customer loyalty, brands, distribution channels, etc.). In this regard, IC may serve as a means (knowledge) to achieve a goal or even as the end product of the knowledge conversion process. Therefore, knowledge conversion processes significantly contribute to value creation in the banking sector. The banking sector is characterized by substantial amounts of IC, suggesting it is more reliant on knowledge, relationships, and skills than on labor [5].

Typically, banking operations are closely linked to customers and largely depend on the integration of information and communication technology to develop new products and services [6]. Although physical capital is essential for banks, it is now emphasized that IC determines the quality of services provided to customers. Furthermore, the importance of IC in the banking sector is heightened by the increasing complexity and the more open environment in which banks currently operate. In fact, competitiveness in this sector largely depends on the quality of human capital and the ability to leverage it [7]. Therefore, given the competitiveness and dynamic nature of the current banking operational environment, IC efficiency is vital for banks to develop advanced strategies aimed at wealth creation [8]. The strategies of banks that frequently acquire and use IC to create value and generate wealth play a role in financial intermediation by reallocating funds from surplus-spending units to deficit-spending units.

In recent times, the banking industry has directed its resources, including IC, toward attracting a large portion of its non-banking population to expand its customer base and deposits. In their efforts to gain a competitive advantage, these banks have turned to activities such as cashless banking, branch expansion, mobile banking, bank guarantees, and other services. These activities also involve conditions and requirements for creating loan assets. A foreseeable outcome is that banks may not be able to fully repay all their loans and advances, leading to a significant rise in Non-Performing Loans (NPLs) [9]. Experts believe that one of the key factors limiting banks' lending capacity is the increase in NPLs, which significantly affects the lending power of the country's banking system. In other words, NPLs arise from two sources: the first is voluntary and discretionary, involving both the borrower and the lender, while the second is influenced by factors beyond the borrower's control, such as macroeconomic and financial conditions, including inflation, exchange rates, and interest rates [10]. Therefore, banking operations are characterized by a high level of risk, necessitating effective management of banks' loan assets, i.e., asset quality (NPL), which involves assessing bank assets to measure the credit risk arising from operations. Asset quality in banks is closely tied to the quality of the loans they make. Deterioration in asset quality directly impacts their financial and operational performance as well as the overall performance of the financial sector [9].

Given the increasing complexity and competitive environment in which banks currently operate, banks need to develop and manage their IC [5]. Although numerous studies exist on IC and its impact on bank performance, there is very little emphasis on the nature of the relationship between IC and banks' NPLs. Accordingly, this study aims to measure and examine the relationship between IC and banks' NPLs.

2 | Theoretical Foundations and Development of Hypotheses

2.1 | Intellectual Capital

IC was first introduced by Machlup [11] in 1962. Later, in 1969, Kenneth Galbraith [12] used the term "IC." In the early 1980s, the general idea of intangible value, often referred to as "goodwill," was proposed by Itami [13]. In the mid-1980s, the information revolution emerged, and the gap between book value and market value significantly increased for many companies. During this period, Teece [14] published a book on extracting value from innovation. In the late 1980s, the first efforts to write and develop statements measuring IC began, highlighted by the publication of The Missing Link and the Fall of Management Accounting by Kaplan and Johnson [15]. Additionally, the book Managing Knowledge Assets was published by Amidon.

In 1990, Scandia appointed Edvinsson [16] as its "Chief IC Officer". This argument was the first time the role of managing IC was legitimized within an organization by creating an official position. Kaplan and Norton [17] introduced the concept and approach of the Balanced Scorecard, which is based on the assumption that what you measure is what you achieve. Additionally, Quinn published the book The Intelligent Organization.

In Nonaka and Takeuchi [18] introduced their influential work on the "knowledge-creating organization". Although this book focuses on knowledge, it carefully distinguishes between knowledge and IC. In 1994, Salmi released a simulation tool called Tango, which became the first best-selling product used in training managers on the importance of intangible factors. Also in 1994, an appendix to Scandia's annual report [19] was prepared, showing its IC inventory. The intellectual capital report generated significant interest and influenced other companies seeking to follow Scandia's pioneering example. Another notable event for "knowledge auditing" occurred in 1995, when Salmi applied a comprehensive assessment of the company's IC status. Experts in the IC movement published several best-selling books on the subject [17], [20], [21]. Among these, the work of Edvinsson and Malone, particularly regarding the processes and methods for measuring IC, has been widely utilized. IC has since become a popular topic among researchers, in academic conferences, and in articles and journals. Numerous large-scale projects, including those in Meritum, Denmark, and Stockholm, have been conducted.

In the early 2000s, the first reputable academic journal, IC, was published. The Danish government issued the first accounting standards for IC. The IC outlook, along with the IC Committee, was established at Scandia. The European Union published its first IC report, and the Brookings Institution released the book Intangible Wealth. During those years, Austrian centers also published IC reports, and the book Managing, Measuring, and Reporting Intangible Assets by Ralou, along with a wide range of books and articles on IC management, was released. Numerous projects aimed at managing and measuring IC were defined and conducted across various organizations, and these efforts continue to this day.

The growing gap between real value and book value has drawn researchers' attention to the invisible value omitted from financial statements. This value, referred to as IC, exists throughout all dimensions of an organization like a knowledge structure, yet is often overlooked [22]. Sokolov and Zavyalova [23] claimed that 50-90% of a company's value arises from IC management. IC is among the key elements that generate wealth for firms, to the extent that some experts assert that an organization's most important asset is its IC. Bontis [24], Director of the IC Research Institute and editor of the Journal of IC, states that in the new millennium, IC has become widespread and is a key to organizational success through wise management.

Many current accounting systems overlook the increasing role and importance of intellectual property and knowledge in modern organizations. They are unable to measure the true value of assets in their calculations. In other words, financial statements have significant limitations in accurately reflecting a company's real value. In today's knowledge-based societies, the return on deployed IC has become crucial. It implies that, in the future, compared to IC, the role and importance of financial capital in determining sustainable profitability

will significantly decrease. This argument has created a gap between the real value of companies and organizations and what is reported in traditional accounting calculations [22].

In addition to the undeniable role of IC in firm success, this asset is increasingly important for the capital market, decision-makers, and financial statement users. Studies indicate that some IC measurement metrics, such as capitalization of research and development expenses, customer satisfaction, and market influence, affect stock prices and company market value, and that investors use this information in evaluating shares [24]. Although IC does not meet recognition criteria in accounting and is not reported in financial statements, it must be acknowledged that these assets exist and influence decisions [25]. For example, Holland [26] showed that analysts and investment fund managers tend to use information related to a company's IC in their decisions and evaluations. The role of IC and its undeniable impact on firm success further emphasize the importance of identifying and disclosing IC information. Therefore, recognizing the factors affecting its disclosure is highly significant, as greater transparency in such information can influence investors' and financiers' decisions and, consequently, the optimal allocation of resources in society.

2.2 | Measurement and Reporting of Intellectual Capital

Today, the role and importance of the return on deployed IC in achieving sustainable, continuous profitability for companies exceeds that of financial capital employed by firms. Research has shown that 50 to 90 percent of the value created by companies in the modern economy, rather than from the production and sale of goods, originates from the management of IC [27]. One of the fundamental problems of traditional accounting systems is their inadequacy and inability to measure and reflect the value of IC in companies' financial statements.

Chen et al. [28] emphasize that measuring the level of IC within an organization is particularly important, as IC is an essential factor in creating value for a business unit. It can be argued that measuring and reporting an organization's IC can provide a new perspective that reveals the hidden value of the organization [29]. To present a comprehensive picture of companies' operational performance and organizational value, all aspects of the organization must be considered. For this purpose, companies should address all potential value-creating factors to achieve their objectives. Therefore, not only must IC be properly measured, but the related information must also be effectively utilized [30]. Without proper and complete identification and measurement of IC, it is impossible to evaluate company performance properly, and management cannot define the business unit's strategies [31].

3.2 | Asset Quality in Banks

The assessment of banks' asset quality, which is largely composed of granted loans, is generally considered synonymous with the quality of the loans extended. It involves accurately identifying all NPLs, calculating their share of total loans, and determining the overall health of the bank's assets. Currently, bank loans are qualitatively classified into three categories: performing, past-due, and non-performing [10].

Asset quality is one of the most important factors in evaluating banking soundness and is assessed based on the risk and liquidity of assets. It reflects the bank's ability to conduct proper operations and recover its assets. [32] states in his research that poor asset quality is the primary reason for most bank failures.

4.2 | Research Hypotheses

I. There is a significant relationship between IC (i.e., banks' value-added coefficient) and NPLs.

II. There is a significant relationship between Human Capital Efficiency (HCE) and banks' NPLs.

III. There is a significant relationship between SC efficiency and banks' NPLs.

IV. There is a significant relationship between employed capital efficiency and banks' NPLs.

3 | Research Method

3.1 | Statistical Population

The statistical population of this study includes banks listed on the Tehran Stock Exchange (TSE) over 19 years, from the beginning of 2004 to the end of 2022. Considering conditions and limitations, a total of 14 banks were selected from the TSE-listed banks.

Sampling Method and Sample Size

The sample was derived from TSE-listed banks based on the following criteria, forming a limited and purposive population used as the study sample:

I. The banks must have been listed on the Tehran Stock Exchange from the beginning of 2004 to the end of 2022.

II. To ensure comparability, all banks must have the same fiscal year ending on 20 December (29/12 in the Persian calendar).

III. Banks must not have changed their fiscal year during the study period (2004–2022).

IV. Banks must not have changed their activity type during the study period (2004–2022).

V. Relevant data must be available.

VI. Based on these restrictions, 14 banks from the Tehran Stock Exchange were selected as the sample for this study.

3.2 | Research Model and Variables

The research model is adapted from the study by Asare et al. [33] and is presented as follows:

Model (1) is used to examine the first research hypothesis, which is specified as follows:

$$\mathrm{NPL_{it}} = \beta_0 + \beta_1 \mathrm{VAIC_{it}} + \beta_2 \mathrm{BAGE_{it}} + \beta_3 \mathrm{BSIZE_{it}} + \varepsilon_{it} \quad (1)$$

Similarly, for the third and fourth hypotheses, *Model (2)* is presented as follows:

$$\mathrm{NPL_{it}} = \lambda_0 + \lambda_1 \mathrm{HCE_{it}} + \lambda_2 \mathrm{SCE_{it}} + \lambda_3 \mathrm{CEE_{it}} + \lambda_4 \mathrm{BAGE_{it}} + \lambda_5 \mathrm{BSIZE_{it}} + \varepsilon_{it} \quad (2)$$

where NPL represents NPLs as the dependent variable, β_0 and λ_0 are constants. VAICit denotes the level of IC of bank i at time t; HCEit is the HCE of bank i at time t; SCEit is the SC efficiency of bank i at time t; CEEit is the employed capital efficiency of bank i at time t; BSIZE it represents the size of bank i at time t; BAGE is the age of bank i at time t; and ε is the error term.

According to statistics published by the Central Bank, in recent years, the ratio of NPLs to total loans in the Iranian banking system has exceeded 10 percent, whereas the International Monetary Fund's normal threshold is below 10 percent [34].

In this study, to examine NPLs as the dependent variable, the ratio of non-NPL performing loans to total loans was used, following Asare et al. [33].

$$\mathrm{NPL_{it}} = \frac{\mathrm{SSl_{it}} + \mathrm{DL_{it}} + \mathrm{LL_{it}}}{\mathrm{GLA_{it}}}.$$

In this context, NPL_{it} represents the NPLs indicator of bank i at time t. SSl_{it}, DL_{it}, and LL_{it} denote, respectively, past-due claims, overdue claims, and doubtful loans of bank i at time t, while GLA_{it} represents the total loans of bank i at time t.

Value Added (VA), as the independent variable in *Model (1)*, is measured for a bank as follows:

$$VA = OUT\text{-}\ IN,$$

where OUT represents a bank's total revenues, including interest income, fees, and commission income. IN refers to the bank's operating expenses, consisting of interest, financial, and administrative costs (excluding personnel expenses, which are considered an investment).

Additionally, the components of the variables in *Model (2)* are as follows:

The VA Intellectual Coefficient (VAIC) measures the efficiency of human, structural, and employed capital. The equation for calculating HCE is as follows:

$$HCE = \frac{VA}{HC},$$

where VA is the defined VA and HC represents the total compensation (salaries and wages) for a bank. The equation for calculating a bank's SC is as follows:

$$SC = VA\text{-}\ HC.$$

VA and HC are as previously defined. Therefore, the equation for SC Efficiency (SCE) is presented as follows:

$$SCE\ = \frac{SC}{VA}.$$

The equation for Employed Capital Efficiency (CEE) is defined as follows:

$$CEE = \frac{VA}{CE},$$

where CEE refers to the efficiency coefficient of employed capital, and CE represents the bank's net book value of assets. In general, the total value-creation efficiency, VAIC, is simply the sum of all value-creation efficiencies, calculated as follows:

$$VAIC™ = HCE + SCE + CEE.$$

4 | Findings

4.1 | Descriptive Statistics

In this section, descriptive statistical indicators are discussed, including central tendency measures (maximum, minimum, mean), dispersion measures (variance and standard deviation), and skewness and kurtosis indices.

Table 2. Model diagnosis test (fixed effects test).

Variable	Symbol	Mean	Median	Maxim	Minim	S.D
Non-performing loans	NPL	0.25	0.25	0.71	0.011	0.17
Intellectual capital	VAIC	4.50	4.19	13.39	0.002	3.22
Human capital	HCE	5.01	4.64	12.45	1.20	1.52
Structural Capital	SCE	0.81	0.88	0.97	0.02	0.20
Capital Efficiency	CEE	0.0	0.03	0.18	0.001	0.04
Bank Age	BAGE	17.68	12	69	1	16.003
Bank Size	BSIZE	19.50	19.56	22.80	15.69	1.48

The mean is the primary and most commonly used measure of central tendency. The mean value lies exactly at the balance point and center of gravity of the data. Variables are considered of good quality if there is little difference between their mean and median.

4.2|Model Diagnostic Tests

Before estimating the model, the relevant tests must be conducted. The first test examines the following hypothesis: given the assumption of constant coefficients, is the intercept the same across all years? In general, to choose between a Pooled model and a Panel model, the following test is applied:

Pooled model: all intercepts are assumed to be equal H_0: $\alpha_1= \alpha_2= \alpha_3=\ldots=\alpha_{T-1}$

Panel model: at least one intercept differs from the others. H_1: $\alpha_i \neq \alpha_j$

To test the above hypothesis, the Chow test is applied. The results of this test are summarized in the table below. If the p-value exceeds 5%, the Pooled estimation method is used.

Table 2. Model diagnosis test (fixed effects test).

Model Title	F-Stat	P-Value	Comparison with 0.05	Test Result
Model 1	9.41	0.0000	Smaller	Null hypothesis confirmed – Pooled model.
Model 2	6.65	0.0000	Smaller	Null hypothesis confirmed – Pooled model.

According to *Table 2*, the F-statistic for the research regression models is significant at the 0.05 level. Therefore, it can be concluded that H_1 (the combined model) is confirmed.

4.3|Test for Choosing Between Fixed or Random Effects Regression (Hausman Test).

After determining that the intercepts are not the same across different years, the appropriate estimation method, fixed effects or random effects, must be selected. The Hausman test is used for this purpose. The null and alternative hypotheses are as follows:

H_0: the combined model with random effects is appropriate.

H_1: The combined model with fixed effects is appropriate.

At a 95% confidence level (α = 5%), the statistic x^2calculated from the regression equation is less than the value x^2obtained from the table, the null hypothesis x^2cannot be rejected, and otherwise H_*It is rejected. In other words, if the significance level of the Hausman test is greater than 0.05, the model with random effects is used, and if H_1The significance level of this test is less than 0.05; the combined model with fixed effects is applied.

Table 3. Hausman test.

Model Title	Stat x^2	P-Value	Test Result
Model 1	23.09	0.0000	Reject null hypothesis – Pooled model with fixed effects.
Model 2	18.06	0.0000	Reject null hypothesis – Pooled model with fixed effects.

According to the Hausman test in *Table 3*, the regression models in this study are better fit by the panel-data fixed-effects estimator.

4.4 | Estimation of the Overall Model Using Panel Analysis and Model Estimation

In this section, the overall model is examined and estimated using panel analysis. The reason for using this method is due to the nature of the data. In panel analysis, data are collected in a cross-sectional time series format. In such data, the independence of observations is not preserved because multiple observations exist for each company across different years, and these observations are dependent on each other. In other words, in this analysis, the total number of data points equals the number of companies multiplied by the number of years.

4.5 | Estimation of the first model

Based on the diagnostic tests described above, since the Limer test indicated that the data are of a combined type and the model exhibits heteroscedasticity, the GLS method was used to estimate the model.

$$\mathrm{NPL}_{it} = \beta_0 + \beta_1 \mathrm{VAIC}_{it} + \beta_2 \mathrm{BAGE}_{it} + \beta_3 \mathrm{BSIZE}_{it} + \varepsilon_{it}$$

H1: There is a significant relationship between IC (i.e., the value-added coefficient of banks) and asset quality.

Table 4. Results of model 1 test.

Variable	Coeffi	T-Stat	Sig	
C	-0.09	-0.47	0.6334	Not influential
VAIC	0.0001	3.12	0.0018	Influential
BAGE	-0.02	-8.33	0.0000	Influential
BSIZE	0.043	3.50	0.0006	Influential
R^2	0.74	F Stat		9.14
Adjusted R^2	0.71	Significance (P-Value)		0.0000
		Durbin-Watson Statistic		2.17

Regarding the first hypothesis of the study, Table 4 shows a p-value of 0.0018 for the two variables, which is lower than the significance level considered in this study (5%). Also, the absolute value of the t-statistic, which is 3.12, is greater than 1.96, the equivalent of the 0.95 standard normal distribution. Therefore, at a 95% confidence level, there is a significant relationship between IC (i.e., the value-added coefficient of banks) and NPLs, and the main hypothesis is confirmed.

4.6 | Fitting the Second Model

Based on the diagnostic tests described above, since the Limer test indicated that the data are of a combined type and the model exhibits heteroscedasticity, the GLS method was used to estimate the model.

$$NPL_{it} = \lambda_0 + \lambda_1 HCE_{it} + \lambda_2 SCE_{it} + \lambda_3 CEE_{it} + \lambda_4 BAGE_{it} + \lambda_5 BSIZE_{it} + \varepsilon_{it}$$

I. There is a significant relationship between HCE and NPLs of banks.

II. There is a significant relationship between SC efficiency and banks' NPLs.

III. There is a significant relationship between capital employed efficiency and banks' NPLs.

Table 5. Results of the model 2 test.

Variable	Coeffi	T-Stat	T-Stat	
C	0.46	1.42	0.155	Not influential
HCE	-0.007	-2.84	0.0051	Influential
SCE	0.05	1.43	0.154	Not influential
CEE	0.57	3.75	0.0003	Influential
BAGE	-0.01	-3.31	0.0012	Influential
BSIZE	0.004	0.20	0.839	Not influential
R^2	0.78	F Stat		6.55
Adjusted R^2	0.71	Significance (P-Value)		0.0000
		Durbin-Watson Statistic		2.12

According to *Table 5*, the significance level between the two variables is 0.001, which is less than the significance level considered in the present study (5%). Also, the absolute value of the t-statistic, which is 2.84, is greater than 1.96, the equivalent of the 0.95 standard normal distribution; therefore, at a 95% confidence level, there is no significant relationship between HCE and NPLs of banks, it is not confirmed, and the second hypothesis is accepted.

According to *Table 5*, the significance level between the two variables is 0.15, which is greater than the significance level considered in the present study (5%). Also, the absolute value of the t-statistic, which is 1.43, is less than 1.96, the equivalent of the 0.95 standard normal distribution; therefore, at a 95% confidence level, there is no significant relationship between SC efficiency and NPLs of banks, it is confirmed, and the third hypothesis is not accepted.

According to *Table 5*, the significance level between the two variables is 0.0003, which is less than the significance level considered in the present study (5%). Also, the absolute value of the t-statistic, which is 3.75, is greater than 1.96, the equivalent of the 0.95 standard normal distribution; therefore, at a 95% confidence level, there is no significant relationship between capital employed efficiency and NPLs of banks, it is not confirmed, and the fourth hypothesis is accepted.

5 | Discussion and Conclusion of the Study

5.1 | Discussion and Conclusion for the First Hypothesis

There is a significant relationship between IC (i.e., the value-added coefficient of banks) and NPLs.

The results from the first hypothesis indicate a significant relationship between IC (i.e., the value-added coefficient of banks) and NPLs. Given the positive coefficient of the IC variable, the relationship between these two variables is positive. In today's knowledge-based environment, IC is not only the most important part of an organization's capital but also provides a sustainable competitive advantage. Therefore, managers should not only enhance their knowledge in the field of IC but also develop and expand this area in the organization by strengthening its components, human capital, SC, and relational capital. The effectiveness and productivity of the organization increasingly depend on attention to knowledge and IC. By understanding the nature of IC and the methods for measuring and valuing it, it becomes possible to plan, optimize, control,

and continuously monitor it within the organization. This finding can be explained by the fact that NPLs in banks are largely driven by SC, HCE, and capital efficiency. Skills, competencies, exposure, experience, innovation, initiatives, and other attributes of bank human capital significantly contribute to bank value creation. As a result, higher bank capital encourages banks to engage in higher-risk loan portfolios, thereby increasing the likelihood of NPLs. The results of testing the first hypothesis are consistent with and supported by the findings of [33].

5.2 | Discussion and Conclusion for the Second Hypothesis

There is a significant relationship between HCE and NPLs of banks.

The results of the second hypothesis indicate a significant relationship between HCE and NPLs for banks. Since human capital encompasses training, educational programs, incentive packages, and related initiatives, increased human capital in banks enhances employees' skills and expertise, thereby reducing NPLs. The results of testing the second hypothesis are consistent with and supported by the findings of [9].

5.3 | Discussion and Conclusion for the Third Hypothesis

"There is a significant relationship between SC efficiency and NPLs of banks.

The results of the third hypothesis indicate that there is no significant relationship between SC efficiency and banks' NPLs. This hypothesis suggests that banks with comprehensive systems and structures, such as a healthy organizational culture, management processes, policies, strong internal controls, IT infrastructure, software packages, and more, tend to have higher-quality loan assets. However, due to limited access to information and data in Iran, SC does not significantly affect the NPLs variable. The results of testing the third hypothesis are consistent with and supported by the findings of [9].

5.4 | Discussion and Conclusion for the Fourth Hypothesis

There is a significant relationship between employed capital efficiency and banks' NPLs.

The results of the fourth hypothesis indicate a significant relationship between employed capital efficiency and banks' NPLs. The amount and type of resources mobilized by banks also influence the level of NPLs, because ultimately, banks use the resources they have mobilized to provide loans. Therefore, there is a positive relationship between employed capital and banks' NPLs. The results of testing the fourth hypothesis are consistent with and supported by the findings of [33].

5.5 | Practical Recommendations of the Study

Iranian banks need to invest more in human capital in terms of training, educational programs, incentive packages, and so on, to improve service quality. It is recommended that organizations and companies, by employing knowledge-based staff, providing in-service training, increasing employee motivation to develop additional expertise and intellectual skills, creating job satisfaction among employees, and establishing effective compensation and reward systems, take important steps to maintain, preserve, and develop their IC. Furthermore, companies and banks are advised to pay greater attention to the valuation of intangible assets when preparing financial statements, to enhance the reliability of these statements. Other recommendations include promoting career development among management and staff, providing additional non-financial benefits, such as health insurance, improving employee compensation, and implementing secure, sound banking systems. Regulations, policies, and guidelines regarding human capital, SC, and employed capital should be aligned to improve loan asset quality. Based on the resource-based view, bank management, in coordination with the Central Bank, should continue to make fundamental investments in IC, particularly in human and SC resources.

Conflict of Interest

The authors declare no conflict of interest.

Data Availability

All data are included in the text.

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