Bank Parikrama
Volume XLVIII, Nos. 3 & 4, September & December, 2023 (pp. 129-153)

Effect of Intellectual Capital on the Financial Performance of Indian Public Sector Banks

- Monika Barak*
- Rakesh Kumar Sharma, Ph.D.**

Abstract

The current article assesses the influence of intellectual capital (I.C) on the financial performance (F.P) of Indian public sector banks (IPSBs). The information was collected from annual reports and CMIE of 12 PSBs for the period 2010 to 2022. For assessing the F.P of IPSBs, a simple panel least square analysis is conducted. Return on assets (ROA), Return on sale (ROS), and return on equity (ROE) are applied as dependent variables. The intellectual capital (I.C) components including structural capital (S.C), relational capital (R.C), human capital (H.C), and capital employed (C.E), have been used as independent variables along with two controlling factors financial leverage and size. The empirical outcomes of the research indicate that C.E, and S.C have a positive significant association with ROA, ROE, and ROS whereas R.C and H.C have a positive insignificant association with ROA, ROE, and ROS. The MVAIC positively insignificant correlates with ROA, ROE, and ROS. The research indicates that decision-makers should manage I.C and its constituents with care because they are a significant source of organizational value. It is essential to keep in mind that excessive investment in I.C results in decreased firms' efficiency and wasteful use of resources, as well as decreased profitability.

Keywords: Modified Value-added Intellectual Capital Coefficient, Indian Public Sector Banks, ROA, ROS, ROE, Intellectual Capital.
JEL Classification: C1, J24

1. Introduction

As a consequence of the worldwide shift from manufacturing-based to knowledge-driven economies, resources related to information and knowledge will become preeminent at the organization level, as well as for the competitiveness of nations and the generation of wealth in such nations (Kramar & Steane, 2012; Lin & Edvinsson, 2008). Intellectual Capital (I.C) is well-defined as ownership of an organization's innovations, the ability and knowledge of its personnel, the organization's experience, and its relationships with

* Monika Barak is a Research Scholar, Thapar Institute of Engineering & Technology, Patiala, Punjab, India, Email: monika.mba@gmail.com; **Rakesh Kumar Sharma, Ph.D., is an Associate Professor, Thapar Institute of Engineering & Technology, Patiala, Punjab, India, Email: rakesh.kumar@thapar.edu. The views expressed in this paper are the authors' own.

stakeholders, all of which lead to goodwill and create value (Xu & Wang, 2019). The discussion of I.C is advanced by the increased interest shown by businesses in expanding their investments not just in physical resources but also in non-physical assets, often known as I.C (Tran & Vo, 2020). I.C becomes the lever for organizations and businesses to maintain sustainable corporate performances and competitive advantage (Marr & Chatzkel, 2004; Poh et al.,2018). Non-physical resources, such as I.C, are just as important to today's economies as financial and physical capital (North & Kumta, 2018). According to stakeholder theory, "managing the stakeholders" is important in the twenty-first century. It focuses on the complex interrelationships that exist between an organization's stakeholders, including its suppliers, customers, investors, employees, society, and other stakeholders. A company ought to provide value for all parties involved, not just shareholders. Relational capital, one of the key elements of I.C, is concerned with how an organization manages its relationships with its stakeholders (Freeman et al., 2010). Because of advancement and dynamic changes in the business era, numerous organizations consider that I.C becomes a vital element in evaluating and measuring the performances in the business fields. Various organizations expected that the firms' performances have been directly impacted by the efficiency of I.C. Among knowledge-intensive business fields, the banking sector is foremost in developing a country's economy by assisting financial transactions and banks directly interacting with customers. The banking sector accumulates surplus funds, make them available for investment and provides finance to business firms, and assists other sectors to manage their activities proficiently and adequately. The performance of different sectors is based on the services given by the banking industry so it is crucial to investigate to what degree banks are proficient in making use of intellectual resources.

Over the course of the past years, the environment around the financial service sector, mainly those operating in the banking sector, has become increasingly vibrant and competitive. Banks provide essential services for fostering economic development and serve as intermediaries (Chen Goh, 2005). For banks to achieve sustainable F.P, competition at various levels compels them to reposition themselves in the marketplace. The banking industry is included among knowledge-based industries (Mondal & Ghosh, 2012). Consequently, the banking

sector has a direct or indirect influence on the tangible assets of all sectors. Numerous researchers Celenza & Rossi (2014); Chen Goh (2005); Inkinen (2015); Nimtrakoon, (2015); Xu & Wang (2019) have agreed that I.C. is a crucial key operator and important strategic resource for the accomplishments of banks, without denying the existence of other significant factors.

India has tie-up with several neighbouring countries and has strong trade associations with them. To close the gap with other SAARC nations, India increased its investment in a variety of infrastructure and development initiatives. India required an additional Rs 50 trillion in 2022 for the sustainable development of its infrastructure. In the beginning, developed nations began utilizing I.C, and it quickly became the focus of the banking industry. I.C measurement had also evolved in other industries, such as the manufacturing industry, the construction industry, and the pharmaceutical industry in developed nations, which regulate business sector competitiveness and development (Poh et al., 2018). The element of I.C and its influence on numerous industries became the gap to recognizing research in developing nations. This vacuum motivates academic researchers to investigate I.C and its function in the banking sector. India evolved as a nation with extraordinary economic development and prosperity. India's gross domestic product (GDP) is greater and more stable than that of its South Asian neighbour's Afghanistan, Sri Lanka, Bangladesh, Nepal, Maldives, Bhutan, and Pakistan. Since 2010, India's GDP has grown by an annual average of 6.6%. During the fiscal year 2020-21, total assets in the banking sector increased to 2.52 trillion US dollars, with assets of PSBs reaching 1.52 trillion US dollars. Due to the expanding function of the financial sector, it is necessary to analyze banks' productivity and performance, as well as how they evaluate and manage their I.C. Moreover, Firer and Mitchell Williams (2003) found that the banking industry held more intellectual property than other industries.

However, this research sheds new insight into the field of I.C and its effect on the F.P of Indian public sector institutions. Previous studies have evaluated the effects of I.C on the F.P of banks using the VAIC model, but our study is unique in that we utilized the MVAIC model to evaluate the effect of I.C on F.P. The research employed simple panel least square estimation. Using the panel data of

12 PSBs in India for the period 2010 to 2022. The results demonstrated that only C.E and S.C has a substantial positive association with ROA, ROE, and ROS. In addition, MVAIC has a positive insignificant related to I.C.

2. Literature Review

A literature review facilitates a critical analysis of published documents pertaining to a research topic. It aids in acquiring in-depth knowledge about a particular subject and comprehending the contributions made by various researchers over time. The previous findings aid in determining the scope of future research and clarify the research conducted to date in a particular field of study. Thus, it serves as a solid foundation for an investigation into the selected topic. The literature review has been divided according to study-relevant variables. In this study, a literature review has been divided into two sections: Theoretical background and I.C and its elements, and I.C and its impact on firms' performance.

2.1 Theoretical Background and I.C and its Elements

The legitimacy hypothesis contends that companies constantly make an effort to ensure that their actions respect society norms and boundaries (Deegan et al., 2002). This legitimacy paradigm places a strong emphasis on how businesses engage with society. The aforementioned point of view contends that an organization must be aware of social community norms since they are an integral element of the organization. According to Ghozali and Chariri (2007), the fundamental concept of legitimacy is a contractual relationship that exists between an organization and the society in which it functions and consumes resources. I.C is a multifaceted concept that includes the firm's relational, structural, capital-employed, and human resources. According to a theory known as resource-based theory, resources are crucial in assisting organizations' growth and competitiveness. According to Grant (1996), the most crucial strategic asset for companies seeking to increase their market share and revenue is I.C. Therefore, it is reasonable to assume that I.C., both overall and for every element, has a favourable effect on a firm's success.

There is no one definition of I.C that is universally recognized. Researchers have defined and categorized the relatively innovative idea of I.C in a variety of different ways. I.C is frequently referred to as non-physical, knowledge-based resources that generate value for enterprises and assist those firms in gaining and retaining a competitive edge (Bontis, 1998; Roos et al., 1997; Sveiby, 1997). The difference between a firm's market and its book value can also be considered in terms of the company's I.C (Maditions et al., 2011). According to Sullivan (2000) I.C is defined as the information a corporation possesses that has the potential to be turned into a concrete profit. A company's ability to acquire or keep an ongoing competitive edge is referred to as I.C (Wang et al., 2014; Youndt & Snell, 2014). Though there are a variety of conceptual frameworks available, two to four components of I.C are generally agreed upon by scholars. These components are relational capital (R.C), structural capital (S.C), human capital (H.C), and capital employed (C.E). Especially Bontis, (1998) and Ruckdeschel (1998) has divided I.C into three different categories: H.C, customer capital, and S.C. I.C was variously classified by a few articles as belonging to the H.C, S.C, and R.C categories (Kujansivu & Lonnqvist, 2007; Sveiby, 1997). The value-added intellectual coefficient model (VAIC) that Public (1998) created is generally applied both in academic settings and in professional settings (Barathi Kamath, 2007; Le et al., 2022; Mohapatra et al., 2019; Mondal & Ghosh, 2012; Xu & Li, 2019). The method VAIC is considered by adding the three constituents of efficiency known as C.E, H.C, and S.C. The VAIC model does have certain drawbacks, such as the fact that it neglects firm R.C and innovation capital (Smriti & Das, 2018). Several research has revised the conventional VAIC model by incorporating an additional element of I.C. referred to as relational capital (Bayraktaroglu et al., 2019; Kapoor & Saihjpal, 2022; Nazari & Herremans, 2007; Nimtrakoon, 2015).

H.C is linked with employees' knowledge, capabilities, skills, expertise, experience, and their ability to give constructive knowledge to the firms further can be implemented to achieve the firm's target and to enhance the productivity of companies (Cabrita & Bontis, 2008; Edvinsson, 1997; Henry, 2013; Ruckdeschel, 1998; Subramaniam & Youndt, 2005). When employees change

their jobs from one organization to another the experience gained by them is also transferred (Stewart, 1997; Henry, 2013; Cohen et al., 2014).

S.C comprises of organizational structure and organizational culture. Values created from the efficient use of technology and information come under organizational culture. Whereas formal techniques applied to organize the firm are related to the organizational structure (Sullivan, 2000). Moreover, Goh (2003) bifurcates structural capital into two sets. The first set consists of intellectual property and databases like trademarks, copyright, and patents. The second set consists of infrastructure resources that are associated with the firm working operations.

The term "capital employed" (C.E) refers to the amount of value that can be produced by an organization by investing one monetary unit either in financial or in physical capital (Xu & Wang, 2019). The capacity of a company to generate value is directly proportional to its C.E, which consists of both its physical and financial capital (Tran & Vo, 2020). R.C comprise of firm's association with its marketing channels, suppliers, customers, and stakeholders (Ferenhof et al., 2015; Inkinen, 2015; Subramaniam & Youndt, 2005).

2.2 Intellectual Capital and its Effects on Firms' Performance

Several researches have been performed in a wide variety of countries to investigate the effects of important aspects of I.C and how they have an impact on the F.P of businesses (Bayraktaroglu et al., 2019; Buallay et al., 2020; Haris et al., 2019; Joshi et al., 2010; Poh et al., 2018; Tiwari & Vidyarthi, 2018). According to the Isanzu (2015) study on Tanzania banks, I.C has a positive association with CEE and HCE, but a negative association with SCE. The profitability and I.C of insurers in Ghana discovered a substantial positive correlation between the two variables (Asare et al., 2017). The research performed by (Anifowose et al., 2018) on Nigerian firms revealed a positive correlation between corporate book value derived from economic value added and I.C. The Australian research conducted by Pulic (2000) demonstrates the significance of I.C. Corporate success and organizational I.C have a significant

correlation. Banks with greater I.C investments are profitable and have superior financial performance.

From 2007 to 2019, Le et al. (2022) analysed thirty commercial banks in Vietnam. The study examined whether I.C could enhance the allocation efficiency, technical efficiency, and pure technical efficiency of institutions. This study also suggests that banks should utilize their competencies and intangible assets to generate more value and wealth for the organization. Salehi et al. (2023) studied 35 firms listed on the Iraq stock exchange. The research discovered negative association between I.C and social capital, as well as financial statement fraud and money laundering.

Chu et al. (2011) carried out research on Hong Kong companies between the years 2005 and 2008. According to the findings of the research, among the four components of I.C, SCE and CEE play an important factor role in forecasting the F.P of businesses, whereas HCE indicates a negative correlation. A huge data of 5749 US commercial banks from the years 2005 to 2012 was employed by (Meles et al., 2016). According to its findings, the H.C have a greater influence on financial performance than other sub-components. Over the years of 2012–2018, Nassar, (2020) performed research on 34 Palestinian companies. The results also show that when compared to S.C and C.E, H.C has the most effective element of I.C.

According to Weqar et al. (2020), the efficiency of I.C considerably raises both the productivity and profitability of Indian banks in the context of the banking industry. Overall, the most important element of I.C for enhancing the effectiveness and productivity of the Indian banking sector is H.C. R.C has a minimal contribution to the banks' F.P, while S.C and C.E are essential for increasing profitability. The effect of several I.C aspects on the operational and F.P of Jordanian banks was examined by Taha et al. (2022). The findings demonstrate that H.C has no effect on F.P. R.C and S.C have a favourable impact on F.P, and all I.C aspects have a positive impact on operational success. According to Tripathy et al. (2015), physical capital positively affects firms' Return on Assets (ROA), proving that it has unquestionably remained a key contributor to the success of Indian businesses.

Nawaz and Haniffa (2017) found a correlation between I.C and profitability using data from 68 Islamic Financial Institutions (IFIs) located in 18 different countries. The findings indicate, in part, that both HCE and CEE have a sizeable and favourably impactful influence on ROA. Another study conducted by Nawaz (2019) analyses 47 Islamic banks from a variety of nations throughout the time-period 2005 to 2010 and noticed H.C had a strong positive effect on market value both before and after the financial crisis. According to Ousama et al. (2020), I.C does have a significant positive influence on the performance of Islamic banks however, this effect is significantly minor compared to the effect seen in previous researches. In addition, the effects of HCE and CEE are beneficial to IB performance, whereas the effect of SCE is negligible. During the years 2011–2013, this study on IB was carried out in the nations that make up the GCC.

According to the results of Sardo and Serrasqueiro (2017), H.C, R.C, and S.C all have a positive effect on the F.P of Portuguese SMEs hotels. According to the findings of Oppong et al. (2019) both intellectual capital and physical capital have a favourable correlation with H.C and ATO in the Ghanaian insurance business. The research performed by Chowdhary et al. (2018) on the textile industry in Bangladesh and discovered that while C.E is favourably associated with financial performance, H.C continues to be insignificant in the industry.

In nutshell, research using the MVIC and VAIC techniques had produced conflicting results in various industries around the world. The inconsistent evidence does not support a compelling conclusion about the relationship between the firm's financial success and I.C. This study provides a better knowledge of the impact of I.C. in the Indian public sector banks by evaluating the effect of I.C. on F.P.

Objectives of the Study

- To investigate which element of intellectual capital (C.E, H.C, S.C, and R.C) has the biggest influence on financial performance.
- To study the effect of total intellectual capital (MVAIC) on financial performance

- To determine which element of intellectual capital is most important for improving profitability.

3. Methodology

3.1 Data Collection

The key aim of this research is to examine the effect of I.C on the financial performance IPSBs. The information on IPSBs were gathered via their annual financial statements and Prowessiq the information system (Centre for Monitoring Indian Economy). From 2010 to 2022, data relating to twelve currently working IPSBs was compiled.

3.2 Research Design

In order to examining the influence of I.C on the F.P of IPSBs a simple panel least square analysis has been carried out. This study employs MVAIC to evaluate the influence of I.C on F.P. Numerous academicians from different countries, including (Aybars & Oner, 2022; Bayraktaroglu et al., 2019; Tiwari & Vidyarthi, 2018; Xu & Li, 2019) employ MVAIC and panel regression. The various approximations serve to represent Structural Capital Efficiency (SCE), Human Capital Efficiency (HCE), Relational Capital Efficiency (RCE), and Capital Employed Efficiency (CEE). All the information about variables is arranged in panel data form. Afterwards descriptive stats and matrix of variable correlation are computed to get to know the nature and relationship among variables. The stationarity of the data series for various factors has been investigated in the second stage using different unit root tests LLC (Levin et al., 2002), ADF (Maddala & Wu, 1999) and Phillips-Perron (PP) (Choi, 2001). In beginning, these are performed at a level. Since data series for different factors were not stationary at level. Following this these are examined at first difference. Since all the factors are found to be constant at first difference. Therefore, all factors' data are converted to the first difference. Panel data estimate is performed afterward. Three dependent variables are present (ROA, ROE, and ROS). For each dependent variable, a model is developed. In the beginning, the influence of the four distinct elements of I.C (S.C, R.C, C.E, and H.C) on each variable that is dependent is investigated. Additionally, the cumulative effect is investigated

using MVAIC. Furthermore, the study employed two control factors, namely leverage and size.

The following are the equations of the models

Model 1. $ROA = \alpha + \beta_0 + \beta_1(SCE)_{it} + \beta_2(RCE)_{it} + \beta_3(CEE)_{it} + \beta_4(HCE)_{it} + \beta_5(LEV)_{it} + \beta_6(SIZE)_{it} + e_{it}$
Model 2. $ROE = \alpha + \beta_0 + \beta_1(SCE)_{it} + \beta_2 (RCE)_{it} + \beta_3 (CEE)_{it} + \beta_4 (HCE)_{it} + \beta_5(LEV)_{it} + \beta_6(SIZE)_{it} + e_{it}$
Model 3. $ROS = \alpha + \beta_0 + \beta_1 (SCE)_{it} + \beta_2 (RCE)_{it} + \beta_3 (CEE)_{it} + \beta_4 (HCE)_{it} + \beta_5(LEV)_{it} + \beta_6(SIZE)_{it} + e_{it}$
Model 4. $ROA = \alpha + \beta_0 + \beta_1 (MVAIC)_{it} + \beta_2 (LEV)_{it} + \beta_3 (SIZE)_{it} + e_{it}$
Model 5. $ROE = \alpha + \beta_0 + \beta_1 (MVAIC)_{it} + \beta_2 (LEV)_{it} + \beta_3 (SIZE)_{it} + e_{it}$
Model 6. $ROS = \alpha + \beta_0 + \beta_1 (MVAIC)_{it} + \beta_2 (LEV)_{it} + \beta_3 (SIZE)_{it} + e_{it}$

3.3 Measurement of Variables

Table:1 Variable Description

S.No	Variables	Sign	Description of variables	Citations
Independent Variables				
1.	Capital employed Efficiency	CEE	The ratio of value-added divided by CE (VA/CE) CE = Equity + Long term borrowings Value-added = Operating profit + employees' cost + Depreciation + Amortization	Pulic (1998,2000, 2004)
2.	Human Capital Efficiency	HCE	The ratio of value-added divided by HC (VA/HC) HC = Total employee expenditure	
3.	Structural capital efficiency	SCE	The ratio of structural capital divided by VA (SC/VA) SC = Value-added - Human capital	
4	Relational capital efficiency	RCE	The ratio of relational capital divided by value-added (RC/VA) RC = The amount invested in marketing, selling, and advertisement expenses	Nazari and Herremans, 2007; Buallay and Madbouly,2019; Weqar and Khan,2020; Tran and Vo, 2020; Oner and Aybars, 2022; Vidyarthi, 2018; Xu and Wang, 2019
5.	Modified value-added intellectual coefficient	MVAIC	It is the sum of all four elements of I.C (CEE+HEC+SCE+RCE)	
Dependent Variables				
6.	Return on assets	ROA	It is the ratio of net income divided by total assets	Xu and Wang, 2019; Buallay and Madbouly,2019; Xu and Liu, 2020; Poh et al, 2018
7.	Return on equity	ROE	It is the ratio of profit available to equity shareholders divided by shareholders' fund	
8	Return on sales	ROS	EBIT/ Net Sales EBIT = Earnings before interest and tax	
Control variables				
9.	Financial Leverage	Lev	It is the ratio of total outside liabilities divided by total assets	Xu and Wang, 2019; Buallay and Madbouly,2019; Oner and Aybars, 2022; Kapoor and Saihjpal, 2022; Weqar and Khan,2020
10.	Total assets	Size	It is the log total assets	

Source: Self compiled by the authors

4. Results and Discussions

Table 2: Summary of Descriptive Statistic

Variables	ROA	ROE	ROS	HC	CE	SC	RC	MVAIC	LEV	SIZE
Mean	0.099	0.983	-11.915	6.131	0.556	0.814	0.803	8.306	15.887	12.896
Std. Dev	0.824	17.395	13.379	1.873	0.551	0.094	1.656	2.420	2.607	0.932
Skewness	-1.598	-2.539	-1.473	0.134	10.825	-4.500	9.742	5.011	0.145	0.489
Kurtosis	5.848	13.467	5.700	2.878	128.972	31.874	109.224	45.334	5.548	3.139
Jarque-Bera	119.214	879.851	103.850	0.563	106195.8	5945.996	75811.38	12302.36	42.773	6.344
Probability	0.000	0.000	0.000	0.754	0.000	0.000	0.000	0.000	0.000	0.041
Sum	15.530	153.420	-1858.820	956.546	86.879	127.069	125.295	1295.791	2478.520	2011.873
Sum Sq. Dev	105.294	46903.78	27746.65	544.087	47.108	1.385	425.366	907.804	1053.457	134.669
Observations	156	156	156	156	156	156	156	156	156	156

Source: Self-compiled with E-views 12

Table-2 is a presentation of the descriptive statistics for all that were considered in this study. The value created by H.C is relatively high, H.C has demonstrated the maximum mean value. Chowdhury et al. (2018); Vergauwen et al. (2007) have previously reached the same conclusion. The unified mean of H.C, R.C, and S.C is 7.748, which is substantially greater than the unified mean of C.E (0.556). According to prior research, firms generate more value through I.C than through financial and physical assets (Mehralian et al., 2012; Vergauwen et al., 2007). Moreover, the mean values obtained for leverage and size are 15.887 and 12.896, respectively.

Table 3: Correlation Matrix

Variables	ROA	ROE	ROS	CEE	HCE	RCE	SCE	MVAIC	LEV	SIZE
ROA	1.000									
ROE	0.948	1.000								
ROS	0.942	0.895	1.000							
CEE	0.133	0.131	0.156	1.000						
HCE	0.447	0.445	0.554	-0.079	1.000					
RCE	-0.291	-0.311	-0.270	-0.028	-0.106	1.000				
SCE	0.438	0.478	0.497	-0.522	0.779	-0.175	1.000			
MVAIC	0.193	0.180	0.299	0.125	0.713	0.588	0.403	1.000		
LEV	-0.269	-0.293	-0.143	-0.096	0.163	0.095	0.042	0.171	1.000	
SIZE	0.134	0.125	-0.008	-0.177	-0.077	-0.170	0.066	-0.214	-0.085	1.000

Source: Self-compiled with E-views12

The multiple correlation analyses are depicted in Table 3, and the outcomes revealed that the dependent variables ROE, ROS, and ROA are positively correlated with the S.C, C.E, H.C, and MVAIC, and negatively correlated with RC. CE demonstrates a negative correlation with the following I.C components: H.C (-0.079), R.C (-0.028), and S.C (-0.522). H.C depicts a negative correlation with C.E (-0.079), R.C (-0.106), and positive with S.C (0.779). C.E (-0.0323), H.C (-0.106), and S.C (-0.175) are negatively correlated with R.C. Nevertheless, S.C is positively associated with H.C (0.779).

Using the unit root test, we examine the stationarity of the data series for all 12 IPSBs over a period of thirteen years, using five independent variables, three dependent variables, and two control variables.

Table 4: Unit Root

Variables	ROA	ROE	ROS	HCE	CEE	SCE	RCE	MVAIC	LEV	SIZE
					LLC					
Without	-12.794	-13.730	-10.749	-14.927	-13.631	-14.371	-19.103	-23.072	-14.130	-10.178
C&T	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
With C	-4.242	-1.961	1.162	-8.103	-2.188	-8.505	-15.138	-21.876	-7.279	-3.592
	(0.000)	(0.024)	(0.005)	(0.000)	(0.014)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
With	-2.191	1.230	4.431	-7.009	1.542	-7.345	-14.581	-17.172	-6.418	-4.500
C&T	(0.012)	(0.008)	(0.007)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
					ADF					
Without	146.565	150.467	125.089	161.538	145.867	165.511	163.828	177.486	148.336	120.940
C&T	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
With C	85.894	85.631	65.751	90.224	80.572	101.417	104.349	114.936	80.729	60.884
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
With	63.056	55.279	43.276	71.074	48.465	76.459	81.554	83.092	52.949	59.202
C&T	(0.000)	(0.003)	(0.009)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
					PP					
Without	234.915	233.349	236.825	237.145	232.349	225.305	233.500	234.234	232.870	209.796
C&T	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
With C	242.137	226.689	224.051	195.690	252.368	220.734	241.989	190.066	206.973	192.821
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
With	206.760	201.807	208.652	206.166	206.004	199.302	195.784	186.226	171.722	178.427
C&T	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Source: Self-compiled with E-views12

*(P value <0.01), ** (P value <0.05), ***(P value <0.1)

The outcomes of panel unit root tests at first difference are shown in Table-4. Various unit root tests have been performed with and without constant and trend variables. The significance value of these unit tests is less than the significance level (0.001), they are summarised in Table-4, along with the statistics for each variable. It indicates that the unit root does not exist and all data series are stable at first difference.

Table 5: Panel Least Square Estimation Using ROA, ROE, ROS (Models 1-3)

Variables	ROA (Model-1)		ROE (Model-2)		ROS (Model-3)	
	Coefficient	T-statistics	Coefficient	T-statistics	Coefficient	T-statistics
HC	0.017	0.319 (0.750)	-1.344	-1.163 (0.246)	0.473	0.606 (0.545)
CE	0.788*	7.852 (0.000)	16.169*	7.545 (0.000)	11.802*	8.143 (0.000)
SC	6.051*	6.107 (0.000)	139.528*	6.603 (0.000)	91.552*	6.406 (0.000)
RC	-0.021	-1.174 (0.242)	-0.463	-1.209 (0.228)	-0.284	-1.098 (0.273)
LEV	-0.032	-1.382 (0.169)	-2.804*	-5.533 (0.000)	-0.372	-1.085 (0.279)
SIZE	0.212	1.613 (0.109)	5.577***	-1.983 (0.064)	3.211***	1.688 (0.093)
C	-0.022	-0.505 (0.613)	-1.778	-1.863 (0.064)	-0.478	-0.741 (0.459)
R-squared	0.577		0.663		0.599	
Adjusted R-squared	0.558		0.648		0.582	
Durbin-Watson stat	2.460		2.746		2.123	
F-statistic	31.153 (0.000)		45.056 (0.000)		34.213 (0.000)	

*(P value <0.01), ** (P value <0.05), ***(P value <0.1)

Source: Self-compiled with E-views12

Using panel least square, Table-5 illustrates the relationship between the bank's F.P and I.C. The dependent variables in this case are ROS, ROE, and ROS. The six explanatory variables are C.E, H.C, R.C, S.C, Leverage, and Size. Leverage and size are the controlling variables.

At the 1% level of significance, it is determined that C.E, and S.C are statistically significant in the first model in which ROA serves as the dependent variable (Anifowose et al., 2018; Kim & Tran, 2023; D. B. Tran & Vo, 2018). The corresponding R^2 value, as well as the adjusted R^2 value, comes in at 0.577 and 0.558 respectively. It indicates that a variety of explanatory variables are capable of adequately explaining 57.7% of the variance in the ROE. In order to test for autocorrelation in the model, the Durbin-Watson method is utilised. Because the value of Durbin-Watson is 2.460, there is neither an autocorrelation nor a serial correlation issue that warrants significant concern. The value of the F-stat. in the current model is 31.153, and the p-value associated with it is less than 0.01, indicates that model is a good fit.

In the second and third model in which ROE and ROS are the dependent variable, C.E, and S.C are significant at the 1% level. Here also only C.E and S.C is positively related to ROE and ROS. Only 66.3% of the variability can be described by Model-2, according to the R^2 value. Just like in the second model, approximately 59.9% variance of the dependent variable is properly explained by different explanatory variables in the Model-3. The value of the Durbin-Watson ratio near to 2 in the both models. Therefore, neither an issue of autocorrelation nor a problem with serial correlation can be seen in the current models. The ROE and ROS model have overall good fitness, as indicated by a high significant ANOVA value (45.056 and 34.213) with a P value that is less than 0.01.

According to Table-5, the Coeff. of C.E and S.C are favorable and substantially significant in all the models, indicating that C.E and S.C are one of the most crucial variables that determines the F.P of public sector banks in India. As a result, C.E and S.C are the significant components that determines a bank's overall F.P. Nevertheless, findings of study consistent with the research results (Chu et al., 2011; Nawaz & Haniffa, 2017; Ozkan et al., 2017; D. B. Tran & Vo, 2018), which indicated that C.E and S.C impacts either explicitly or implicitly to bank efficiency.

Table 6: Panel Least Square Estimation Using ROA, ROE, ROS (Models 4-6)

Variables	ROA (Model-4)		ROE (Model-5)		ROS (Model-6)	
	Coefficient	T-statistics	Coefficient	T-statistics	Coefficient	T-statistics
MAVIC	0.017	0.833 (0.406)	0.085	0.195 (0.845)	0.336	1.071 (0.285)
LEV	-0.165*	-6.373 (0.000)	-5.510*	-10.318 (0.000)	-2.407*	-6.231 (0.000)
SIZE	0.352**	2.026 (0.044)	8.583**	2.403 (0.017)	5.327**	2.061 (0.041)
C	-0.102	-1.745 (0.083)	-3.357	-2.787 (0.006)	-1.700	-1.951 (0.053)
R-squared	0.236		0.435		0.231	
Adjusted R-squared	0.220		0.423		0.215	
Durbin-Watson stat	2.751		2.688		2.492	
F-statistic	14.455 (0.000)		36.061 (0.000)		14.087 (0.000)	
*(P value <0.01), **(P value <0.05), *** (P value <0.1)						
Source: Self-compiled with E-views12						

The combined effect of I.C and two control variables on the three dependent variables (ROA, ROE, and ROS) is presented in Table-6. For the purpose to evaluate the effect that MVAIC has on financial performance in terms of ROA, ROE, and ROS, three distinct multiple regression models have been constructed (Models 4, 5, and 6). The combined intellectual capital (MVAIC) shows positive insignificant impact on ROA, ROE, and ROS. In other words, MVAIC has no effect on the financial condition of banks. The leverage, which is a control variable, represents the negative significant influence on ROA, ROE, and ROS. Whereas Size shows positive significant association with ROA, ROE, and ROS. According to the coefficient of determination (R^2), the model 4 is only able to explain 23.6% of the variability, 43.5 % in Model-5, and 23.1% in Model-6. The corresponding Durbin-Watson ratio in all three model is near to 2, which shows that there is no issue with serial correlation in the model. The entire model is a good fit because the F-stat. value is 14.455 in Model-4, 36.061 in Model-5, and 14.087 in Model-6 and the corresponding p-value is less than 0.01.

5. Conclusion, implication, limitation, and future research

This current research analysed the effect of I.C on the F.P of Indian public sector banks operating in India over thirteen year (2010-2022). In order to study the effect that I.C has on F. P. the simple panel least square estimation method is utilised. This study identifies the various components of I.C (H.C, C.E, S.C and R.C). Later, these components of I.C are employed as independent variables to examine their influence on the F.P of Indian PSBs. The three financial ratios of ROA, ROE, and ROS were applied as dependent parameters while financial leverage and size have been utilised as control variables to illustrate the F.P of PSBs in India. After collecting information for each variable across thirteen years and twelve PSBs, the information was arranged in a balanced panel format. In the initial phase, unit root test is conducted at the level and first difference. At first difference, the information of all factors is found to be stable. Therefore, the data series for all variables are transformed into the first difference. Later, a basic panel least square estimation utilising three dependent variables (ROA, ROE, and ROS) is performed.

The empirical outcomes of the research indicate that C.E and S.C have a significant positive association with ROA, ROE, and ROS. The statistical relationship between C.E,S.C and F.P indicators may be the most convincing evidence that C.E. and S.C. are the essential components of I.C (Chowdhury et al., 2018; Firer & Mitchell Williams, 2003, 2003; Ginesti et al., 2018; Mehralian et al., 2012; D. B. Tran & Vo, 2018). The results demonstrate that MVIAC is not correlated with F.P indicators. This demonstrates that, even in knowledge-based businesses, an organization's performance is still measured in terms of its physical assets. This goes without a doubt against the claim made by many academics that knowledge-driven corporations need the I.C. more in order to acquire an edge over competitors (Marr & Chatzkel, 2004).

This study has a number of implications. The findings suggest that the Indian public sector banks keep functioning on conventional means, including monetary and physical capital as well as organizational structure, regulations, and procedure. In order to improve their financial position in the cutthroat and knowledge-based market, bank management should concentrate on how to use and manage the C.E and S.C resources effectively. Although the relationship of H.C and R.C with the F.P indicators is insignificant. Therefore, it is necessary to reconsider the importance of investing in I.C. For improving H.C and financial efficiency viewpoint continuous training and development should be given to employees for enhancing their competencies. However, policymakers can allocate additional benefits; increase wages, profit sharing, and equity incentives to increase employee motivation. The research pointed out that decision-makers should check administrative and selling expenses and employee expenses which can also create financial wealth.

From the viewpoint of S.C, for the smooth functioning of operations and improvement, corporate efficiency policymakers should continuously keep an eye on relevant policies, strategies, and procedures. Managers should also keep in mind and recognize the importance of knowledge-based infrastructure, innovation capital, social environment, and administrative processes available within the organization. It is important to understand that too much investment in

I.C, resulting in lower corporate efficiency and resources can be engaged and not profitable to an organization.

The study expresses that decision-makers should meticulously handle I.C and its elements because these are important sources of financial value creation and corporate performance. In addition, for improving financial efficiency, the organization should not overinvest in I.C. For achieving continuous and credible success in this knowledge-based and tough business era, the company resources must be non-substitutable and inimitable, rare, and valuable. With the start of the information base era, now organizations are utilizing and more prone to intangible resources and resources like I.C in their working operations.

The researcher identifies a few study limitations. Only public sector banks had been selected for the analysis of the banks' financial performance and I.C however, there are many more various types of banks in India that should also be considered. Second, for measurement the F.P of the banking sector few variables are selected, further research can include more dependent and control variables. Third, the research includes only one sector which is the banking sector, researchers may take into consideration other sectors and analysed the effect of I.C. Finally, future studies can use primary data to figure out how I.C affects a firm's financial success.

References

Anifowose, M., Abdul Rashid, H. M., Annuar, H. A., & Ibrahim, H. (2018). Intellectual capital efficiency and corporate book value: Evidence from Nigerian economy. *Journal of Intellectual Capital*, *19*(3), 644–668. https://doi.org/10.1108/JIC-09-2016-0091

Asare, N., Alhassan, A. L., Asamoah, M. E., & Ntow-Gyamfi, M. (2017). Intellectual capital and profitability in an emerging insurance market. *Journal of Economic and Administrative Sciences*.

Aybars, A., & Oner, M. (2022). The impact of intellectual capital on firm performance and value: An application of MVAIC on firms listed in Borsa Istanbul. *Gazi Journal of Economics and Business*, *8*(1). https://doi.org/10.30855/gjeb.2022.8.1.004

Barathi Kamath, G. (2007). The intellectual capital performance of the Indian banking sector. *Journal of Intellectual Capital*, *8*(1), 96–123. https://doi.org/10.1108/14691930710715088

Bayraktaroglu, A. E., Calisir, F., & Baskak, M. (2019). Intellectual capital and firm performance: An extended VAIC model. *Journal of Intellectual Capital*, *20*(3), 406–425. https://doi.org/10.1108/JIC-12-2017-0184

Bontis, N. (1998). Intellectual capital: An exploratory study that develops measures and models. *Management Decision*, *36*(2), 63–76.

Buallay, A., Hamdan, A. M., Reyad, S., Badawi, S., & Madbouly, A. (2020). The efficiency of GCC banks: The role of intellectual capital. *European Business Review*, *32*(3), 383–404. https://doi.org/10.1108/EBR-04-2019-0053

Cabrita, M. D. R., & Bontis, N. (2008). Intellectual capital and business performance in the Portuguese banking industry. *International Journal of Technology Management*, *43*(1/2/3), 212. https://doi.org/10.1504/ IJTM. 2008.019416

Celenza, D., & Rossi, F. (2014). Intellectual capital and performance of listed companies: Empirical evidence from Italy. *Measuring Business Excellence*, *18*(1), 22–35. https://doi.org/10.1108/MBE-10-2013-0054

Chen Goh, P. (2005). Intellectual capital performance of commercial banks in Malaysia. *Journal of Intellectual Capital*, *6*(3), 385–396. https://doi.org/10.1108/14691930510611120

Choi, I. (2001). Unit root tests for panel data. *Journal of International Money and Finance*, *20*(2), 249–272. https://doi.org/10.1016/S0261-5606(00)00048-6

Chowdhury, L. A. M., Rana, T., Akter, M., & Hoque, M. (2018). Impact of intellectual capital on financial performance: Evidence from the Bangladeshi textile sector. *Journal of Accounting & Organizational Change*.

Chu, S. K. W., Chan, K. H., Yu, K. Y., Ng, H. T., & Wong, W. K. (2011). An Empirical Study of the Impact of Intellectual Capital on Business Performance. *Journal of Information & Knowledge Management*, *10*(01), 11–21. https://doi.org/10.1142/S0219649211002791

Deegan, C. (2006). Legitimacy theory. In *Methodological issues in accounting research: Theories, methods and issues* (pp. 161–181). Spiramus Press Ltd.

Edvinsson, L. (1997). Developing intellectual capital at Skandia. *Long Range Planning*, *30*(3), 366–373.

Ferenhof, H. A., Durst, S., Zaniboni Bialecki, M., & Selig, P. M. (2015). Intellectual capital dimensions: State of the art in 2014. *Journal of Intellectual Capital*, *16*(1), 58–100. https://doi.org/10.1108/JIC-02-2014-0021

Firer, S., & Mitchell Williams, S. (2003). Intellectual capital and traditional measures of corporate performance. *Journal of Intellectual Capital*, *4*(3), 348–360. https://doi.org/10.1108/14691930310487806

Freeman, R. E., Harrison, J. S., Wicks, A. C., Parmar, B. L., & De Colle, S. (2010). *Stakeholder theory: The state of the art*.

Ghozali, I., & Chariri, A. (2007). *Accounting Theory. Semarang: Badan Penerbit Universitas Diponegoro*. Bahasa.

Ginesti, G., Caldarelli, A., & Zampella, A. (2018). Exploring the impact of intellectual capital on company reputation and performance. *Journal of Intellectual Capital*, *19*(5), 915–934.

Goh, S. C. (2003). Improving organizational learning capability: Lessons from two case studies. *The Learning Organization*.

Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, *17*(S2), 109–122.

Haris, M., Yao, H., Tariq, G., Malik, A., & Javaid, H. (2019). Intellectual Capital Performance and Profitability of Banks: Evidence from Pakistan. *Journal of Risk and Financial Management*, *12*(2), 56. https://doi.org/ 10.3390/ jrfm 12020056

Henry, L. (2013). Intellectual capital in a recession: Evidence from UK SMEs. *Journal of Intellectual Capital*, *14*(1), 84–101. https://doi.org/10.1108/ 1469193 1311289039

Inkinen, H. (2015). Review of empirical research on intellectual capital and firm performance. *Journal of Intellectual Capital*, *16*(3), 518–565. https://doi.org/10.1108/JIC-01-2015-0002

Joshi, M., Cahill, D., & Sidhu, J. (2010). Intellectual capital performance in the banking sector: An assessment of Australian owned banks. *Journal of*

Human Resource Costing & Accounting, *14*(2), 151–170. https://doi.org/10.1108/14013381011062649

Kapoor, S., & Saihjpal, A. (2022). Intellectual capital and performance of Indian companies: An empirical investigation. *International Journal of Learning and Intellectual Capital*, *19*(6), 608. https://doi.org/10.1504/ IJLIC. 2022.126306

Kim, S. Y., & Tran, D. B. (2023). Intellectual capital and performance: Evidence from SMEs in Vietnam. *Asia-Pacific Journal of Business Administration*. https://doi.org/10.1108/APJBA-08-2022-0343

Kramar, R., & Steane, P. (2012). Emerging HRM skills in Australia. *Asia-Pacific Journal of Business Administration*.

Kujansivu, P., & Lönnqvist, A. (2007). Investigating the value and efficiency of intellectual capital. *Journal of Intellectual Capital*, *8*(2), 272–287. https://doi.org/10.1108/14691930710742844

Le, T. D., Ho, T. N., Nguyen, D. T., & Ngo, T. (2022). Intellectual capital – bank efficiency nexus: Evidence from an emerging market. *Cogent Economics & Finance*, *10*(1), 2127485. https://doi.org/10.1080/2332 2039.2022. 2127485

Levin, A., Lin, C.-F., & Chu, C.-S. J. (2002). Unit root tests in panel data: Asymptotic and ÿnite-sample properties. *Journal of Econometrics*.

Maddala, G. S., & Wu, S. (1999). A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test. *Oxford Bulletin of Economics and Statistics*, *61*(S1), 631–652. https://doi.org/10.1111/1468-0084.0 610s 1631

Maditinos, D., Chatzoudes, D., Tsairidis, C., & Theriou, G. (2011). The impact of intellectual capital on firms' market value and financial performance. *Journal of Intellectual Capital*, *12*(1), 132–151.

Meles, A., Porzio, C., Sampagnaro, G., & Verdoliva, V. (2016). The impact of the intellectual capital efficiency on commercial banks performance: Evidence from the US. *Journal of Multinational Financial Management*, *36*, 64–74.

Marr, B., & Chatzkel, J. (2004). Intellectual capital at the crossroads: Managing, measuring, and reporting of IC. *Journal of Intellectual Capital*.

Mehralian, G., Rajabzadeh, A., Sadeh, M. R., & Rasekh, H. R. (2012). Intellectual capital and corporate performance in Iranian pharmaceutical industry. *Journal of Intellectual Capital*, *13*(1), 138–158.

Mohapatra, S., Jena, S. K., Mitra, A., & Tiwari, A. K. (2019). Intellectual capital and firm performance: Evidence from Indian banking sector. *Applied Economics*, *51*(57), 6054–6067. https://doi.org/10.1080/00036 846. 2019. 1645283

Mondal, A., & Ghosh, S. K. (2012). Intellectual capital and financial performance of Indian banks. *Journal of Intellectual Capital*, *13*(4), 515–530. https://doi.org/10.1108/14691931211276115

Nassar, S. (2020). Impact of Intellectual Capital on Corporate Performance. *European Journal of Business and Management Research*, *5*(6). https://doi.org/10.24018/ejbmr.2020.5.6.647

N. Isanzu, J. (2015). Impact of Intellectual Capital on Financial Performance of Banks in Tanzania. *Journal of International Business Research and Marketing*, *1*(1), 17–24. https://doi.org/10.18775/jibrm.1849-8558. 2015. 11.3002

Nawaz, T. (2019). Intellectual capital profiles and financial performance of Islamic banks in the UK. *International Journal of Learning and Intellectual Capital*, *16*(1), 87–97.

Nawaz, T., & Haniffa, R. (2017). Determinants of financial performance of Islamic banks: An intellectual capital perspective. *Journal of Islamic Accounting and Business Research*, *8*(2), 130–142. https://doi.org/ 10.1108/JIABR-06-2016-0071

Nazari, J. A., & Herremans, I. M. (2007). Extended VAIC model: Measuring intellectual capital components. *Journal of Intellectual Capital*, *8*(4), 595–609. https://doi.org/10.1108/14691930710830774

Nimtrakoon, S. (2015). The relationship between intellectual capital, firms' market value and financial performance: Empirical evidence from the ASEAN. *Journal of Intellectual Capital*, *16*(3), 587–618. https://doi.org/ 10.1108/JIC-09-2014-0104

North, K., & Kumta, G. (2018). *Knowledge management: Value creation through organizational learning*. Springer.

Oppong, G. K., Pattanayak, J. K., & Irfan, Mohd. (2019). Impact of intellectual capital on productivity of insurance companies in Ghana: A panel data analysis with System GMM estimation. *Journal of Intellectual Capital*, *20*(6), 763–783. https://doi.org/10.1108/JIC-12-2018-0220

Ousama, A. A., Hammami, H., & Abdulkarim, M. (2020). The association between intellectual capital and financial performance in the Islamic banking industry: An analysis of the GCC banks. *International Journal of Islamic and Middle Eastern Finance and Management*, *13*(1), 75–93.

Ozkan, N., Cakan, S., & Kayacan, M. (2017). Intellectual capital and financial performance: A study of the Turkish Banking Sector. *Borsa Istanbul Review*, *17*(3), 190–198. https://doi.org/10.1016/j.bir.2016.03.001

Poh, L. T., Kilicman, A., & Ibrahim, S. N. I. (2018). On intellectual capital and financial performances of banks in Malaysia. *Cogent Economics & Finance*, *6*(1), 1453574. https://doi.org/10.1080/23322039.2018.1453574

Pulic, A. (1998). Measuring the performance of intellectual potential in knowledge economy. *2nd McMaster Word Congress on Measuring and Managing Intellectual Capital by the Austrian Team for Intellectual Potential*, 1–20.

Pulic, A. (2000). VAIC^{TM}–an accounting tool for IC management. *International Journal of Technology Management*, *20*(5–8), 702–714.

Pulic, A. (2004). Intellectual capital–does it create or destroy value? *Measuring Business Excellence*.

Roos, J., Edvinsson, L., & Dragonetti, N. C. (1997). *Intellectual capital: Navigating the new business landscape*. Springer.

Ruckdeschel, C. (1998). Intellectual capital: The new wealth of organizations by Thomas Stewart. *Performance Improvement*, *37*, 56–59.

Salehi, M., Ali Mohammed Al-Msafir, H., Homayoun, S., & Zimon, G. (2023). The effect of social and intellectual capital on fraud and money laundering in Iraq. *Journal of Money Laundering Control*, *26*(2), 227–252. https://doi.org/10.1108/JMLC-12-2021-0142

Sardo, F., & Serrasqueiro, Z. (2017). A European empirical study of the relationship between firms' intellectual capital, financial performance and market value. *Journal of Intellectual Capital*, *18*(4), 771–788. https://doi.org/10.1108/JIC-10-2016-0105

Smriti, N., & Das, N. (2018). The impact of intellectual capital on firm performance: A study of Indian firms listed in COSPI. *Journal of Intellectual Capital*, *19*(5), 935–964. https://doi.org/10.1108/JIC-11-2017-0156

Stewart, T. A. (1997). Intellectual capital: The new wealth of organizations, Bantam Doubleday Dell Publishing Group. *Inc., New York, NY*.

Subramaniam, M., & Youndt, M. A. (2005). The influence of intellectual capital on the types of innovative capabilities. *Academy of Management Journal*, *48*(3), 450–463.

Sullivan, P. H. (2000). *Value driven intellectual capital: How to convert intangible corporate assets into market value*. John Wiley & Sons, Inc.

Sveiby, K. E. (1997). *The new organizational wealth: Managing & measuring knowledge-based assets*. Berrett-Koehler Publishers.

Taha, N., Alshurafat, H., & Al Shbail, M. O. (2022). The impact of different intellectual capital dimensions on banks operational and financial performance. *International Conference on Business and Technology*, 946–956.

Tiwari, R., & Vidyarthi, H. (2018). Intellectual capital and corporate performance: A case of Indian banks. *Journal of Accounting in Emerging Economies*, *8*(1), 84–105. https://doi.org/10.1108/JAEE-07-2016-0067

Tran, D. B., & Vo, D. H. (2018). Should bankers be concerned with Intellectual capital? A study of the Thai banking sector. *Journal of Intellectual Capital*, *19*(5), 897–914.

Tran, N. P., & Vo, D. H. (2020). Human capital efficiency and firm performance across sectors in an emerging market. *Cogent Business & Management*, *7*(1), 1738832. https://doi.org/10.1080/23311975.2020.1738832

Tripathy, T., Gil-Alana, L. A., & Sahoo, D. (2015). The effect of intellectual capital on firms' financial performance: An empirical investigation in India. *International Journal of Learning and Intellectual Capital*, *12*(4), 342–371.

Vergauwen, P., Bollen, L., & Oirbans, E. (2007). Intellectual capital disclosure and intangible value drivers: An empirical study. *Management Decision*, *45*(7), 1163–1180. https://doi.org/10.1108/00251740710773961

Wang, Z., Wang, N., & Liang, H. (2014). Knowledge sharing, intellectual capital and firm performance. *Management Decision*.

Weqar, F., Khan, A. M., & Haque, S. M. I. (2020). Exploring the effect of intellectual capital on financial performance: A study of Indian banks. *Measuring Business Excellence*, *24*(4), 511–529. https://doi.org/ 10.1108/ MBE-12-2019-0118

Xu, J., & Li, J. (2019). The impact of intellectual capital on SMEs' performance in China: Empirical evidence from non-high-tech vs. high-tech SMEs. *Journal of Intellectual Capital*, *20*(4), 488–509. https://doi.org/10.1108/JIC-04-2018-0074

Xu, J., Liu, F., & Korea University Business School. (2020). The Impact of Intellectual Capital on Firm Performance: A Modified and Extended VAIC Model. *Journal of Competitiveness*, *12*(1), 161–176. https://doi.org/10 .7441/joc.2010.01.10

Xu, J., & Wang, B. (2019). Intellectual Capital Performance of the Textile Industry in Emerging Markets: A Comparison with China and South Korea. *Sustainability*, *11*(8), 2354. https://doi.org/10.3390/su11082354

Yeh-Yun Lin, C., & Edvinsson, L. (2008). National intellectual capital: Comparison of the Nordic countries. *Journal of Intellectual Capital*, *9*(4), 525–545.

Youndt, M. A., & Snell, S. A. (2004). Human resource configurations, intellectual capital, and organizational performance. *Journal of Managerial Issues*, 337–360.