RESEARCH ARTICLE

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Intellectual Capital Efficiency and Performance of Banks in India

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Abstract

The aim of this paper is to examine the impact of intellectual capital efficiency on the performance of commercial banks in India for two time periods, viz. 2018-19 and 2020-21 representing the pre and post-merger periods. The IC efficiency (ICE) of the banks is measured using the standard Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE). The performance is measured in terms of Return on Assets (ROA), Return on Equity (ROE), Net Interest Margin (NIM), and Return on Investments (ROI). The results show that sub-components of IC have impacted the performance of banks variedly, but not consistently. The ICE of private sector banks has increased over the period of study. The impact of merger on the ICE performance of the individual public sector banks has been mixed, though on the average, there is no immediate statistically significant impact of the mergers on the ICE performance of all the public sector banks in India.

Key words: Intellectual Capital Performance, Human Capital, Banking, Productivity, Profitability, Mergers

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Banking industry relies primarily on two important intangible assets, human capital i.e. mainly its employees and customer capital. With the increasing use of technology to provide banking services, the structural capital also has gained significance. All these are components of intellectual capital (IC) that are as important as tangible assets in value creation for all firms operating in the service sector in the knowledge economy.

Measuring IC efficiency therefore becomes an important aspect, as it can be effectively managed to ensure long run competitiveness and enhancing the value of the firm. The research on measurement of IC and its significance is well established. Though, the emerging economies were initially slow to venture in this area, but in recent decade, the studies in this area has substantially picked up. This study is aimed at measuring the IC of commercial banks in India and also analyzing the impact of it on the profitability of these banks. Additionally it also intends to estimate the impact of recent mergers on the banks IC performance.

Structure and Performance of Indian Banking Industry

Reserve Bank of India established in 1935 is the apex bank in India, which performs several developmental and promotional functions besides the primary functions as the central bank. Banking structure in India is classified into Commercial banks and Co-operative banks. Commercial bank further is classified into: (1) Schedule Commercial Banks (SCBs) and non-scheduled commercial banks. SCBs include private, public, foreign banks and Regional Rural Banks (RRBs); and (2) Co-operative banks which include urban and rural Co-operative banks. There is development banks also established with specific objectives of catering to the requirements of sectors like agriculture, Small industries, exporters etc. In 2021, Indian banking system consisted of 12 public sector banks, 22 private sector banks, 44 foreign banks, 43 regional rural banks, 1,484 urban cooperative banks and 96,000 rural cooperative banks in addition to cooperative credit institutions. (IBEF)

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Banking system in India has undergone many changes since independence, post nationalization in 1969, post liberalization in 1991 and the recent phase of consolidations through mergers in 2019. Banking system also contributes towards overall economic growth, as it is an important segment of the vibrant service sector.

The total deposits and advances of all SCBs are Rs. 155 lakh crore and 108L crore respectively in the year 2021, out of which PSBs account for 99L crore and 63L crore respectively; PVBs contribute 48L crore and 39L crore respectively. The share of Public Sector Banks (PSBs) in total advances as well as in deposits has been declining since 2010-11, while private sector banks (PVBs) have been improving their share. The credit to GDP ratio has been growing, but India's is still markedly lower than the G20 average. At end-March 2020, the GNPA ratio relating to priority sector loans increased to 8.3 per cent from 7.6 per cent in the previous year, driven primarily by delinquencies in agricultural and micro and small enterprises lending.

Mergers in Indian Banking

Corporate restructuring in India are regulated by a well-defined legal framework, however the Central Government may in exercise of the powers conferred by Section 9 of the Banking Companies (Acquisition and Transfer of Undertakings) Act, 1970/ 1980 and after consultation with the Reserve Bank of India, notify the Scheme Amalgamation of Banks. The increasing extent of frauds, the high profile defaults, increasing NPA's in the Public sector banks, forced the government to announce mergers of several banks in 2019 and it was effective from 1st April 2020. The losses incurred by the four PSBs including Bank of Baroda, IDBI Bank Ltd, Oriental Bank of Commerce and Central Bank of India were INR. 21,646.38 crores in the year ending March 31, 2018, after which the government planned these merger. (Chaudhary, 2021) The number of PSB's was reduced to 12.

Some other major reasons for bank mergers can be to offer relief to weak banks and improve their operational efficiency, consolidation to capitalize on larger market share, customer base, funds, technology and infrastructure. These mergers do have long term impact on employees, customers, shareholders and board of directors, the positive impact of efficiency gains is expected to outweigh the challenges. The details of mergers of banks and its impact on their ranks are presented in Appendix 1 and 2.

Most mergers are viewed by researchers from the point of view of its rationale, motives, impact on the market concentration, financial, market or operating performance, and from human resource management perspective of the merged entity. There have been no studies in Indian context that looks at the IC performance of these firms, post-merger, this paper attempts to fill this gap.

Though the primary objective is to understand the IC performance of all the banks operating in India, a specific section on whether or not mergers have impacted their IC performance is also studied. After the brief introduction and overview of Indian banking structure, the next section deals with the review of previous work, and identifying the gaps. This is followed by specifying the major objectives of this study. The methodology is explained in detail, followed by the results and its analysis. The implication for future research and policy making is presented along with conclusions in the last section.

Review of Earlier Literature:

A systematic review of literature classified based on the findings and country context is presented in this section

Al-Musali and Ismail (2014) study the financial performance of the banks and its association with its intellectual capital performance in Saudi Arabian Banks. They find that the VAIC and financial performance measured in terms of ROE and ROA is positively and significantly associated. However, in case of IC sub-components, the impact is strong only for HCE. They have studied all the banks in Saudi Arabia, but the sample size is only 11 banks that exist in that country, which may be taken into account while validating the results. In another study by Al-Musali and Ismail (2016) related to all GCC countries, they find a positive impact of IC on financial performance of banks. However, HCE showed positive impact in some countries and negative in others. SCE, CEE and bank financial performance

indicators have varied impact and different from one country to another. CE exerted higher influence on performance than SC.

Alrashidi and Alarfaj (2020) also study the impact of VAIC and its sub-components on the bank credit and insolvency risks in Saudi Arabian banks, and reported a negative relationship in case of IC and HCE.

Kamal *et al* (2012) also report similar results both for VAIC and HCE in the context of Malaysian banks. Musali and Ismail (2012) in another study find that the IC performance of the banks themselves is determined by a host of factors such as corporate governance characteristics, ownership, internationality, banking industry concentration. Besides these, other bank specific and banking industry characteristics also have a major role to play.

Ozkan *et al* (2017) find in their study of Turkish banks that VAIC and profitability of banks have no significant association. Among the sub-components, it was reported that CEE has higher impact than HCE on ROA of these banks. SCE was seen to have no association with the profitability for the period of study.

Puntillo (2009) was among the first few studies which looked at the impact of IC (VAIC) performance of banks listed in Milan Stock Exchange, Indonesia on the market valuation and financial performance. Only CEE was seen to have a strong positive association. Radianto (2011) find a strong and significant positive relation between the IC performance of banks in Indonesia and its financial performance. It is also observed that there has been no significant difference in the IC performance due to the financial crisis of 2008. Santoso (2012) reported a moderate positive relationship between intellectual capital and each of its components with the performance of banks measured by its return on assets. They suggest that banks performance can be improved through focusing on the sub-component that has highest impact. Ulum *et al* (2014) in their study of Indonesian banks find that some public sector banks are among the top-performers in the VAIC based rankings. Soewarno and Tjahjadi (2020), also report an association between IC (using VAIC and A-VAIC) and its sub-components with the performance indicators in the Indonesian banking sector, however there is no specific uniformity in their reported results.

Abdulsalam *et al* (2011) applied the VAIC for measuring the IC performance of Kuwaiti banks for a ten year period. They found that the non-commercial banks outperformed the commercial banks in the last few years of their study. The ranking of banks differed on the various IC sub-components.

Mondal and Ghosh (2012) perform a similar estimation of VAIC for 65 Indian banks; they found that IC of banks do have a significant impact on the banks profitability and productivity, however, the impact on the financial performance of the banks did not have any uniform results across years and variables. They have used 10 multiple regression equations for each of the ten years of study to estimate the impact.

Mention and Bontis (2013) analyze the factors that influence the banking performance in Luxembourg and Belgium. Using survey method for a sample of over 200 banks, the research finds that human capital is highly significant in determination of banking performance. Relational capital is observed to have a negative impact.

Buallay (2019) analyze the impact of IC on conventional and Islamic banking on operational, financial and market performance. The study compares the impact of IC on these group of banks and find that though both sets profitability get influenced by IC efficiency, in Islamic banks, the market performance also additionally shows a positive impact

Ousama *et al* (2019) reported that the IC in Islamic banks of GCC countries is lower than what was reported by other studies. Their empirical analysis finds a significant positive impact of IC on financial performance of these banks. The HC has the strongest impact, followed by CE; it was also reported that the impact of SC was insignificant.

Al-Zoubi (2013) reported from his study of all Jordanian banks found that there is a positive correlation between all the components of the SWOT analysis and IC. Intellectual capital components are recognized as a strategic asset for maintaining strategic competitive position in the market, which is reinforced by the research finding of positive significant impact of IC and its sub-components on the SWOT.

Asare *et al* (2021) in their study on the relationship between IC and asset quality of banks in Ghana, find that there is no significant relationship between them. However, they also observed that HCE and SCE have shown significant positive impact on the quality of assets of these banks.

Nawaz and Haniffa (2017) examined the 64 Islamic financial institutions (IFIs) operating in 18 different countries for the period 2007-2011, to study the impact of IC (using VAIC method) on their financial performance. It was seen that there is a positive impact of IC on ROA, however, when analyzed from the sub-components, only HCE and CEE is seen to have a strong statistical significance on the financial performance. They observe that Islamic banking is an evolving area, and therefore it becomes essential to understand the underlying dynamics of these institutions in a networked economy.

Bharathi (2010) study finds that the IC performance of the private sector banks is better than public sector banks in Pakistan. HCE contributes the most to IC performance of all banks.

Rehman *et al* (2012) analyzed the same for banking sector in Pakistan and found significant positive relationship between IC and all its sub-components with their financial performance. However, the findings of this study cannot be generalized as the data is only for one year. Khan *et al* (2015) study only Islamic banks in Pakistan and find that both ROA and ROE are positively impacted by the IC performance. They also report a strong association between HCE, CEE on banks performance.

Lipunga (2015) report that IC is very low in commercial banks of Malawi; however, it is showing an upward trend. The Human capital efficiency is highest among the IC sub-components.

Ghosh and Maji (2014) analyze the impact of IC and its sub-components on the insolvency and credit risk of Indian banks, and report an inverse relation between overall IC, HCE and credit risk of the commercial banks. The evidence w.r.t. to insolvency risk was indeterminate in establishing any specific relationship.

Ahuja and Ahuja (2012) find that the IC performance of private sector banks in India has been growing faster as well as larger than public sector. Chahal and Bakshi (2016) report relational capital is more significant in Indian banking sector. They use survey method to collect the data from senior executives of different banks in Jammu state of India. Their analysis finds that all the three sub-components have a strong positive impact in determining the IC of banks. The banks need to improve their structural capital performance.

Salehi *et al* (2014) report that IC efficiency positively impacts on the profitability ratios of Iranian Banks.

Murthy and Mouritsen (2011) claim IC and financial capital of firms are more complementary in nature rather than being causal. They also show through their case study how the sub-components of IC compete with each other while interacting. The IC is developed by investments and this in turn is a part of financial capital or budgeting process of the banks. Therefore looking at IC influencing financial capital in a linear relationship may not always bring in optimal results.

Shih *et al* (2010) emphasize the significance of knowledge creation in banks. They find that knowledge creation has a strong positive impact on HC and in turn on SC and customer capital. Knowledge management is significant to build a strong competitive advantage and competitiveness.

Do Rosa and Vaz (2006) use a small sample to analyze the impact of IC on performance of Portuguese banks. They report that IC and sub-components interact and significantly to have a positive impact on the business performance.

Adesina (2019) report IC exerts positive effects on bank technical, allocative and cost efficiencies of the banks operating in 31 African countries. The researcher in his empirical study covering all regions of Africa claim similar results for the regions as well. In case of sub-components of IC, only human capital is seen to have positive impact.

Young *et al* (2009) reveal that human capital is extremely significant in value creation of banking in eight Asian economies that were researched.

Nabi *et al* (2019) find that overall IC performance measured through VAIC has a significant positive

influence on banking performance in Bangladesh. However, they report that among the sub-components its only capital employed efficiency (CEE) which is associated more than other factors.

El-Bannany (2008) differs in their approach to study IC and the researcher focusses on establishing the factors that actually influence the IC performance of banks in UK. The bank profitability and bank risk play a significant role besides other factors like IT efficiency and overall banks efficiency.

Alhassan and Asare (2016) in their research on banking industry in African region find that VAIC does influence the productivity, and human capital and CEE are most important and statistically significant among the sub-components.

Cabrita and Bontis (2008) also report a significant relationship between IC and banking performance in Portuguese banking industry. In another paper by Cabrita *et al* (2007) they model and examine the different interrelationships between IC and its sub-components from the perspective of Portuguese banking and their value creation find that human capital is the most important of them all. The main implication for practicing managers is that they must consider all elements of intellectual capital when developing a strategy to harvest intangible assets for sustainable performance, rather than focusing on one aspect.

Tsao and Hung (2014) in their study of Taiwanese banks find that human capital has a strong significant impact on the performance, whereas the customer capital has negative impact, which is a very surprising result reported, as banks rely heavily on customer base for their performance and growth.

Selvam *et al* (2020) also use VAIC method to estimate the impact of IC on banks performance in India. They find that though there has been a significant growth recorded in the banking sector in India; this has been biased in favour of public sector banks.

Kehelwalatenna and Premaratne (2014) confirm the existence of impact of IC on performance of banks in US, however, it was noticed that the long term performance of these banks have sharply deteriorated over the period of study. They also note in another paper that IC and stock market performance indicators do not have any significant associations; however, some lagged effect was reported (Kehelwalatenna and Premaratne, 2012).

Joshi *et al* (2010) study the Australian Banks and to analyze the main determinants of IC performance, they find that HCE is higher than SCE and CEE for the sample data.

Chen (2005) also studied the banks in Malaysia using the VAIC methodology, and found that HCE of the banks were far higher than SCE and CEE. It was also reported that the foreign banks had relatively better performance than domestic ones.

Reed et al (2006) evaluate the relationship between human capital and financial performance in terms of profitability and claim it is contingent on the level of the firm's internal/external social capital and its organizational capital. The study is focused on banks operating in the USA. Therefore, they suggest instead of investing heavily in both people and information systems, managers may look at these as substitutive resources.

Ting and Lean (2009) report VAIC and all its sub-components are positively and significantly related to ROA for the banking sector in Malaysia.

Jin and Wang (2020) report that intellectual capital efficiency restricts risk-taking behaviors and enhances accounting conservatism in US bank industry. HCE and RCE are also seen to have strong impact on the bank accounting conservatism. Although it is observed that Intellectual capital adds substantial value to commercial banks.

Tran and Vo (2018) found that CEE enhances banks profitability, whereas HCE reduces it in the current period, but has potential to influence it positively in the long run. The study based on Thai Banking industry, suggests that employee efficiency should be the main focus of banks for financial sustainability.

The first paper on IC performance of banks in India reports significant variation in the performance of

various banks, with a bias in IC performance towards foreign sector banks. The performance of all banks is seen to increase during the period of study. Mavridis (2004) had also reported similar variation in performance for Japanese banks. Wang *et al* (2013) stress on the importance of IC in achieving high levels of bank efficiency in South East Asian Banks.

Thus, the above literature clearly shows that there is a gap in research analyzing the performance post-merger of the banks in India. Even the research that has focused on the IC performance of the banks is not recent, and requires a fresh look in the context of new policy changes. The following *objectives* would enable the paper to study the gaps systematically.

- To analyze the IC and its sub-components efficiency of public and private sector banks in India.
- To study the impact if IC efficiency on the performance of the public and private sector banks in India.
- To evaluate the impact of mergers on the IC performance of the banks.

Hypothesis:

Based on the previous studies and general trends, the following testable hypothesis has been developed.

H1: It is expected that the ICE of the commercial banks have increased during the period of study

H1a: It is expected that on an average ICE of the private sector banks will be greater than that of the public sector banks for the period of study.

H2: It is hypothesized that ICE of these banks have a positive association with the performance viz. ROA, ROE, ROI, and NIM of these banks.

H3: It is hypothesized that mergers have had a positive impact on the ICE of the merged entity.

Research Methodology:

The study looks at two distinct *time periods*, viz. 2018-19 and 2020-21 to account for pre and post-merger performance.

Sample: The Sample for the study is all the public sector and private sector banks operating in India for the said time period. Due to mergers, the number of banks for the two time periods would be different. Therefore a time series data for public sector banks could not be used. The data for the study is collected from the Reserve Bank of India, database on Indian economy. The time series data on the statistical tables related to banks in India is used.

Model for Estimation:

The following models have been used in the paper, to assess the impact of ICE on the performance of banks.

Table 1: Descriptive statistics of dependent and independent variables (2018-19 and 2020-21)

Variable	Mean	Median	Minimum	Maximum	Std. Dev.
2018-19					
HCE	2.850	2.801	-0.641	6.121	1.287
SCE	0.640	0.650	-0.030	2.558	0.360
ICE	3.490	3.444	0.939	6.957	1.356
ROA	-0.442	0.040	-5.490	4.250	1.813
ROE	-11.437	0.679	-103.27	18.962	27.218
NIM	2.769	2.540	1.332	8.923	1.168
ROI	7.136	7.184	5.525	8.533	0.503
2020-21					
HCE	3.219	2.861	1.456	6.534	1.298
SCE	0.643	0.650	0.313	0.846	0.129
ICE	3.863	3.512	1.770	7.381	1.415
ROA	0.473	0.460	-2.550	2.130	0.869
ROE	4.523	5.024	-39.155	16.608	9.633
NIM	3.127	2.796	2.063	7.317	1.037
ROI	6.529	6.560	5.556	7.997	0.509

Table 2 provides the results of regression for all the four dependent variables for the FY 2018-19. It can be observed that three models are statistically significant. The goodness of fit of ROA model is around 0.45. Only Human Capital Efficiency (HCE) is highly statistically significant $p<0.000$ (0.823) and positively impacts the RoA of these banks. The other variables SCE, Type and size of the banks do not show any significant association. In case of ROE of these banks, the adjusted R^2 is 0.38, and the model is overall significant. Here, again HCE (9.048) has a strong positive association. The type of bank also seems to have a statistically significant impact on the ROE, especially for the private sector banks.

The NIM also shows a strong statistically significant model $p<0.000$. The NIM is used as a measure of efficiency of the banks. The adjusted R^2 is 0.38. The HCE (0.564) of the banks are highly impacting the NIM of the sample banks. The size of the banks also impacts the performance of these banks. However, it is noted that for the year, 2018-19, the small banks in the sample are more efficient in terms of NIM, as size is seen to be inversely related (−0.365). As in case of ROI, the model is not statistically significant and none of the variables in the model explain the changes.

Thus, it can be concluded, that HCE has been a major determinant for ROA, ROE and NIM of the sample banks. These results are similar to that of Al-Musali and Ismail, (2014; 2016). The size and type of the banks also have some impact on the performance of the banks.

Source: Estimated by the author

Table 2: Results of Regression- Financial Performance (2018-19)

Dependent Variables	ROA		ROE		NIM		ROI	
N	37		37		37		37	
Adjusted R2	0.4515		0.3874		0.3840		0.024	
F statistic	9.4397		7.4830		7.3896		1.2583	
p-value	0.0000		0.0000		0.0001		0.3037	
	t-value		t-value		t-value		t-value	
Intercept	0.622	0.268	−18.449	−0.501	5.257***	3.323	8.265***	9.640
Explanatory Variables	Beta		Beta		Beta		Beta	
HCE	0.823***	4.017	9.048***	2.783	0.564***	4.032	−0.010	−0.138
SCE	1.092	1.670	17.121	1.649	0.599	1.342	−0.344	−1.421
SIZE	−0.312	−1.309	−1.793	−0.473	−0.365**	−2.244	−0.071	−0.811
TYPE	−0.701	−1.188	−16.904*	−1.804	−0.123	−0.305	−0.025	−0.116

For all Regression Tables: * Indicates that beta is significant at 10%; ** significant at 5%; *** indicates beta significant at 1%

Source: Estimated by the author

Table 3 gives the results of the models for the year 2020-21. The number of banks has drastically come down especially in the public sector, due to extensive mergers. The models are statistically significant. The ROA has a good adjusted R^2 at 0.416. None of the variables except Structural capital efficiency (SCE) (3.847) seem to be associated among the explanatory variables. Again in case of ROE, SCE is the only variable which has strong positive association. The size and type of the banks are not having any influence on the performance of the banks in the said year.

NIM which measures the efficiency of the banks has an adjusted R^2 at 0.358; the model is significant at 5 percent. However, none of the explanatory variables in the model has shown any statistically significant impact on the performance. The model on ROI is significant at 10 percent. Both HCE (−0.325) and SCE (2.770) are having an association with the Return on Investment of these banks

Thus, it can be observed that for the FY 2020-21, it's the SCE which has a strong impact on the performance of the banks. The type and size of these banks do not influence for any of the four models. Thus, hypothesis H2 is accepted only partially, as the performance is not impacted by both the components of IC for both the years of study for all the models. The results vary, which has been presented above. Similar conclusion was arrived at by Mondal and Ghosh , 2012.

Table 3: Results of Regression- Financial Performance (2020-21)

Dependent Variables	ROA		ROE		NIM		ROI	
N	28		28		28		28	
Adjusted R2	0.4162		0.3281		0.3587		0.1321	
F statistic	6.705		4.907		5.4751		2.2177	
p-value	0.0006		0.003		0.0021		0.0926	
	t-value		t-value		t-value		t-value	
Intercept	−1.568	−1.182	−29.937*	−1.898	4.054**	2.444	7.024***	7.405
Explanatory Variables	Beta		Beta		Beta		Beta	
HCE	0.0123	0.055	−3.593	−1.360	0.365	1.315	−0.325*	−2.045
SCE	3.847*	1.841	66.533**	2.680	0.008	0.003	2.770*	1.855
SIZE	−0.024	−0.200	0.453	0.310	−0.152	−0.992	−0.104	−1.187
TYPE	−0.466	−1.259	−6.610	−1.500	−0.625	−1.349	0.150	0.568

Source: Estimated by the author

Table 4 below provides the IC performance ranking of top five private and public sector banks for the two time periods. In case of private sector banks, it is quite clearly observed that the ranking of the top two banks remain the same in both the periods. The ICE performance of all the five top private sector banks has increased over the years. It can also be seen that the top five ranks are retained by the same set of banks, though their positions have marginally varied, despite improvement in ICE.

Table 4: IC performance of Public and Private Sector Banks 2018-19 and 2020-21

Rank	Public sector Bank	ICE	Private Sector bank	ICE	Public sector Bank	ICE	Private Sector bank	ICE
1	BANK OF BARODA	4.40	HDFC BANK LTD.	6.96	UCO BANK	3.88	HDFC BANK LTD.	7.38
2	UNION BANK OF INDIA	4.09	INDUSIND BANK LTD	6.18	UNION BANK OF INDIA	3.81	INDUSIND BANK LTD	7.14
3	ANDHRA BANK	3.93	AXIS BANK LIMITED	5.80	PUNJAB NATIONAL BANK	3.54	ICICI BANK 6 LIMITED	.32
4	CORPORATION BANK	3.92	BANDHAN BANK LIMITED	5.50	BANK OF BARODA	3.45	AXIS BANK LIMITED	5.98
5	INDIAN BANK	3.88	ICICI BANK LIMITED	5.22	INDIAN BANK	3.43	BANDHAN BANK LIMITED	5.92

Source: Estimated by the author

In case of the public sector banks, ranking among the top five has changed over the period. Bank of Baroda which held the first position, in the year 2018-19, saw a decline in its ICE performance post-merger with Dena bank and Vijaya Bank, consequently its ranking also decreased to number four. Union Bank of India retained its second position in both the years; it was merged with Andhra Bank and Corporation Bank. UCO bank ranks first in the period 2020-21. It was not in top five in the pre-merger period. The Punjab National Bank which was merged with United Bank of India, risen up to third rank in the post-merger period. The Indian bank which was merged with Allahabad bank retained its fifth position in both time periods, though it's ICE decreased in the latter year. There is a decrease in the performance in terms of ICE of most public sector banks over the period of study.

Thus, it can be observed that there has not been much change in the ranking based on ICE in the private sector banks. However, merger has had mixed effects on the ICE of the public sector banks, wherein performance of some banks have increased, for others it has decreased or remained the same. The hypothesis H1, that the ICE of all the commercial banks have increased, cannot be accepted, as ICE of only private sector banks have increased over the period of study.

As can be observed in the Table 5, there is a statistically significant difference in the ICE performance of all the public sector banks and private sector banks in both the time periods of the study. The mean performance of private sector has increased from 3.89 to 4.23 and it's higher to the mean performance of the public sector banks in both the years. Therefore hypothesis H1a can be clearly accepted.

Table 5: Results of t-test

2018-19	**N**	**Mean**	**StDev**	**SE Mean**
Public Sector	20	3.044	0.8014	0.179
Private Sector	22	3.896	1.6273	0.347
Test Statistic t = -2.1818				
P-Value = 0.0368				
2020-21	**N**	**Mean**	**StDev**	**SE Mean**
Public Sector	12	3.218	0.5642	0.163
Private Sector	21	4.232	1.6244	0.354
Test Statistic t = -2.5993				
P-Value = 0.015				
	N	**Mean**	**StDev**	**SE Mean**
Public Sector 2018-19	20	3.044	0.8014	0.179
Public Sector 2020-21	12	3.218	0.5642	0.163
Test Statistic t = 0.7184				
P-Value = 0.4782				

Source: Estimated by the author

The mean performance of public sector banks has also increased post-merger, from 3.04 to 3.21; however, the increase is not statistically significant (p>0.000). The hypothesis H3 cannot be accepted and it is seen that merger has not had any immediate statistically significant impact on the ICE performance of the public sector banks.

Conclusions:

The impact of intellectual capital on the performance of service and human capital intensive industries has always been an interesting area for research. In the recent years, the Indian banking sector has seen policy changes in terms of mergers of several large public sector banks. There have been very few studies that have looked at the IC efficiency of these banks and its impact on the overall performance of the public sector and private sector banks in India. The present study attempted to analyze the impact of ICE on ROA, ROE, NIM and ROI of the banks for two time periods, pre-merger and post-merger. The results show that HCE and SCE have an impact on the performance of the banks in varied ways and time periods. The results are partially similar to those reported by Cabrita *et al* (2007); Young *et al* (2009); Joshi *et al* (2010); Tsao and Hung (2014); Al-Musali and Ismail, (2014; 2016). The results re-impose the need to emphasize the significance of human capital in the performance of the banks. The internal policy and management must give enough weightage to human capital so that their contribution can further be enhanced. There is a significant difference in the ICE performance of the public sector and private sector banks. The mergers seem to have no immediate impact on the ICE of the banks. The long term impact of the mergers is a subject matter of future research.

References:

Abdulsalam, F., Al-Qaheri, H., & Al-Khayyat, R. (2011). The intellectual capital performance of Kuwaiti banks: an application of VAIC model. *İBusiness*, *3*(1), 88-96.

Adesina, K. S. (2019). Bank technical, allocative and cost efficiencies in Africa: The influence of intellectual capital. *The North American Journal of Economics and Finance*, *48*, 419-433.

Ahuja, B., & Ahuja, N. L. (2012). Intellectual capital approach to performance evaluation: a case study of the banking sector in India. *International Research Journal of Finance and Economics*, *93*(1), 110-122.

Alhassan, A.L. and Asare, N. (2016), "Intellectual capital and bank productivity in emerging markets: evidence from Ghana", Management Decision, Vol. 54 No. 3. pp. 589 - 609

Al-Musali, M. A. K., & Ismail, K. N. I. K. (2014). Intellectual capital and its effect on financial performance of banks: Evidence from Saudi Arabia. *Procedia-Social and Behavioral Sciences*, *164*, 201-207.

Al-Musali, M.A. and Ku Ismail, K.N.I. (2016), "Cross-country comparison of intellectual capital performance and its impact on financial performance of commercial banks in GCC countries", International Journal of Islamic and Middle Eastern Finance and Management, Vol. 9 No. 4, pp. 512-531.

Alrashidi, A., & Alarfaj, O. (2020). The Impact of Intellectual Capital Efficiency on Bank Risks: Empirical Evidence from the Saudi Banking Industry. *International Journal of Economics and Financial Issues*, *10*(4), 206.

Al-Zoubi, M. R. (2013). The Impact of Intellectual Capital on SWOT Analysis among Jordanian Banking Industry" Empirical Study". *International Journal of Business and Social Science*, *4*(2).pp. 123-137

Asare, N., Laryea, M.M., Onumah, J.M. and Asamoah, M.E. (2021), "Intellectual capital and asset quality in an emerging banking market", *Asian Journal of Accounting Research*, Vol. 6 No. 1, pp. 55-68.

Bharathi, Kamath G. (2010) : The intellectual capital performance of banking sector in Pakistan, Pakistan Journal of Commerce and Social Sciences (PJCSS), ISSN 2309-8619, Johar Education Society, Pakistan (JESPK), Lahore, Vol. 4, Iss. 1, pp. 84-99

Buallay, A. (2019), "Intellectual capital and performance of Islamic and conventional banking: Empirical evidence from Gulf Cooperative Council countries", *Journal of Management Development*, Vol. 38 No. 7, pp. 518-537.

Cabrita, M. D. R., & Bontis, N. (2008). Intellectual capital and business performance in the Portuguese banking industry. *International Journal of Technology Management*, *43*(1-3), 212-237.

Cabrita, M. D. R., De Vaz, J. L., & Bontis, N. (2007). Modelling the creation of value from intellectual capital: a Portuguese banking perspective. *International Journal of Knowledge and Learning*, *3*(2-3), 266-280.

Chahal, H., & Bakshi, P. (2016). Measurement of intellectual capital in the Indian banking sector. *Vikalpa*, *41*(1), 61-73.

Chen Goh, P. (2005), "Intellectual capital performance of commercial banks in Malaysia", *Journal of Intellectual Capital,* Vol. 6 No. 3, pp. 385-396.

do RosÃ, M., & Vaz, J. L. (2006). Intellectual Capital and Value Creation: Evidence from the Por-tuguese Banking Industry. *Electronic Journal of Knowledge Management*, *4*(1), pp11-20.

El-Bannany, M. (2008), "A study of determinants of intellectual capital performance in banks: the UK case", *Journal of Intellectual Capital*, Vol. 9 No. 3, pp. 487-498.

Ghosh, S. K., & Maji, S. G. (2014). The impact of intellectual capital on bank risk: Evidence from Indian banking sector. *IUP Journal of Financial Risk Management*, *11*(3), pp. 18-38

http://www.ukca.in/wp-content/uploads/2021/07/Mergers-in-the-Banking-Sectors.pdf Chaudhary, M., 2021, Analysis of Merger and Acquisition trends of Banking Sectors in India and its legal consequences

Jin, J., Wang, W., & Lee-Chin, M. (2020). Determinants and consequences of intellectual capital efficiency in the US banking industry. Michael Lee-Chin & Family Institute for Strategic Business Studies, Working paper series 2020-01, pp.1-37 accessed at http://hdl.handle.net/11375/26096

Joshi, M., Cahill, D. and Sidhu, J. (2010), "Intellectual capital performance in the banking sector: An assessment of Australian owned banks", *Journal of Human Resource Costing & Accounting*, Vol. 14 No. 2, pp. 151-170.

Kamal, M. H. M., Mat, R. C., Rahim, N. A., Husin, N., & Ismail, I. (2012). Intellectual capital and firm performance of commercial banks in Malaysia. *Asian Economic and Financial Review*, *2*(4), 577-590.

Kehelwalatenna, S., & Premaratne, G. (2012, October). An examination of the value relevance of intellectual capital: The case of banking industry. In *Proceedings of 19th International Business Research Conference*. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2174211

Kehelwalatenna, S., & Premaratne, G. (2014). Intellectual capital performance and its long-run behavior: The US banking industry case. *New Zealand Economic Papers*, *48*(3), 313-333.

Khan, M. M. S., Yasser, F., & Hussain, T. (2015). Intellectual capital and financial performance: An evaluation of Islamic banks in Pakistan. *Intellectual Capital and Financial Performance: An*

Evaluation of Islamic Banks. Islamic Banking and Finance Review, 2(1), 59-75.

Lipunga, A. M. (2015). Intellectual capital performance of the commercial banking sector of Malawi. *International Journal of Business and Management*, *10*(1), pp.210-222

Mavridis, D.G. (2004), "The intellectual capital performance of the Japanese banking sector", *Journal of Intellectual Capital*, Vol. 5 No. 1, pp. 92-115.

Mention, A. and Bontis, N. (2013), "Intellectual capital and performance within the banking sector of Luxembourg and Belgium", *Journal of Intellectual Capital*, Vol. 14 No. 2, pp. 286-309

Mondal, A. and Ghosh, S.K. (2012), "Intellectual capital and financial performance of Indian banks", *Journal of Intellectual Capital*, Vol. 13 No. 4, pp. 515-530.

Nabi, M. N., Gao, Q., Rahman, M. T., Britton, S. O., & Islam, M. M. (2019). Intellectual capital and corporate performance: evidence from banking industry of Bangladesh. *International Journal of Human Resource Studies*, *10*(1), 234-259.

Nawaz, T. and Haniffa, R. (2017), "Determinants of financial performance of Islamic banks: an intellectual capital perspective", *Journal of Islamic Accounting and Business Research*, Vol. 8 No. 2, pp. 130-142.

Ousama, A.A., Hammami, H. and 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*, Vol. 13 No. 1, pp. 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.

Puntillo, P. (2009). Intellectual capital and business performance. Evidence from Italian banking industry. *Electronic Journal of Corporate Finance*, *4*(12), 97-115.

Radianto, W. E. (2011). The influence of intellectual capital on banking industry performance: a case in indonesia stock exchange before and after the 2008 global financial crisis. *Asia Pacific Journal of Accounting and Finance*, *2*(1), 39-50.

Reed, K. K., Lubatkin, M., & Srinivasan, N. (2006). Proposing and testing an intellectual capital-based view of the firm. *Journal of Management studies*, 43(4), 867-893.

Rehman, W. U., Rehman, H. U., Usman, M., & Asghar, N. (2012). A Link of intellectual capital performance with corporate performance: comparative study from banking sector in Pakistan. *International Journal of Business and Social Science*, *3*(12). Pp. 313-321

Salehi, M., Seraj, A. H. M., & Mohammadi, R. (2014). The Effect of Intellectual Capital on the Profitability Ratios in the Banking Industry: Evidence from Iran. *IUP Journal of Bank Management*, *13*(1), 38-52

Santoso, E. (2012). *Intellectual capital in Indonesia: The influence on financial performance of banking industry*. University of Phoenix. (PhD Thesis)

Selvam, M., Thanikachalam, V., Kathiravan, C., Sankarkumar, A. V., & Dhamotharan, D. (2020). Intellectual Capital Performance and its Impact on Indian Commercial Banking Industry. *Journal of Engineering and Applied Sciences*, *14*(8), 2019.

Shih, K., Chang, C. and Lin, B. (2010), "Assessing knowledge creation and intellectual capital in banking industry", *Journal of Intellectual Capital*, Vol. 11 No. 1, pp. 74-89.

Soewarno, N. and Tjahjadi, B. (2020), "Measures that matter: an empirical investigation of intellectual capital and financial performance of banking firms in Indonesia", *Journal of Intellectual Capital*, Vol. 21 No. 6, pp. 1085-1106

Tran, D.B. and Vo, D.H. (2018), "Should bankers be concerned with Intellectual capital? A study of the Thai banking sector", *Journal of Intellectual Capital*, Vol. 19 No. 5, pp. 897-914.

Tsao, H. H., & Hung, Y. C. (2014). Intellectual capital and performance in banking industry of Taiwan. *International journal of innovation and learning*, *16*(1), 34-52.

Ulum, Ihyaul and Ghozali, Imam and Purwanto, Agus (2014) *Intellectual Capital Performance of Indonesian Banking Sector: A Modified VAIC (M-VAIC) Perspective.* International Journal of Finance & Accounting, 6 (2). pp. 103-123.

Vijaya Murthy & Jan Mouritsen, 2011. "The performance of intellectual capital," *Accounting, Auditing & Accountability Journal*, Emerald Group Publishing Limited, vol. 24(5), pages 622-646, June.
Wang, W. K., Lu, W. M., & Wang, Y. H. (2013). The relationship between bank performance and intellectual capital in East Asia. Quality & Quantity, 47(2), 1041-1062.

Wei Kiong Ting, I. and Hooi Lean, H. (2009), "Intellectual capital performance of financial institutions in Malaysia", *Journal of Intellectual Capital*, Vol. 10 No. 4, pp. 588-599.

Young, C. S., Su, H. Y., Fang, S. C., & Fang, S. R. (2009). Cross-country comparison of intellectual capital performance of commercial banks in Asian economies. *The Service Industries Journal*, *29*(11), 1565-1579.

Appendix 1

Public Sector Banks: Existing And Merged

2019 Rank	Name	Nationalised	Merged with	Year of merger	1980 Rank
1	State Bank of India	1955			1
2	Bank of Baroda	1969			2
3	Bank of India	1969			3
4	Central Bank of India	1969			4
5	Punjab National Bank	1969			5
6	Canara Bank	1969			6
7	UCO Bank	1969			7
8	Indian Overseas Bank	1969			9
9	Union Bank of India	1969			10
10	Indian Bank	1969			11
11	Bank of Maharashtra	1969			15
12	Punjab & Sind Bank	1980			17
13	Mahila Bank	(Started as a PSB)	SBI	2017	
14	State Bank of Bikaner and Jaipur		SBI	2017	19
15	State Bank of Patiala		SBI	2017	21
16	State Bank of Hyderabad		SBI	2017	22
17	State Bank of Travancore		SBI	2017	23
18	State Bank of Mysore		SBI	2017	24
19	IDBI Bank	(started as DFI)	Sold to LIC	2018	
20	Dena Bank	1969	Bank of Baroda	2019	14
21	Vijaya Bank	1980	Bank of Baroda	2019	20
22	Syndicate Bank	1969	Canara Bank	2019	8
23	Allahabad Bank	1969	Indian Bank	2019	13
24	United Bank of India	1969	PNB	2019	11
25	Oriental Bank of Commerce	1980			26
26	Andhra Bank	1980	Union Bank of India	2019	16
27	Corporation Bank	1980	Union Bank of India	2019	25

Note: Three public sector banks had already been merged 7. The New Bank of India (Delhi based), merged with PNB in 1991. 2. State Bank of Indore and Saurashtra merged with SBI in 2070 and 2008 respectively.

Source: Ministry of Finance, RBI, Author's analysis
Source: https://www.bloombergquint.com/opinion/the-origins-of-the-great-indian-bank-merger

Appendix 2

Banks Ranked By Business She (March 2019)

	Business Market (₹ L Cr)	Share (%)
SBI	52.05	22.5
PNB+OBC+United Bank	17.94	7.7
HDFC Bank	17.50	7.6
Bank of Baroda	16.13	7.0
Canara + Syndicate	15.20	6.6
Union Bank + Andhra Bank + Corporation Bank	14.59	6.3
ICICI Bank	12.72	5.5
Axis Bank	10.60	4.6
Bank of India	9.03	3.9
Indian Bank + Allahabad Bank	8.08	3.5

Source: https://www.oliveboard.in/blog/bank-merger-list/