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Research Article

Determining the Impact of Intellectual and Human Capital on the Firm's Value: A Case of the US Banking Sector

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Abstract:

Aims & Objectives: The following research study has examined the effect of intellectual and human capital on firm value in the U.S. banking industry, particularly the moderating influence of firm size.

Methods: Based on the Resource-Based View (RBV) and Human Capital Theory, the study examined how intangible assets enhance competitive advantage and sustainable value creation. With a panel dataset of 30 NYSE-listed U.S. commercial banks over 2010-2024, and Generalised Least Squares (GLS) regression to account for heteroscedasticity and autocorrelation, the research discovered that human capital, as represented by revenue per employee, had a significant positive effect on firm value ($\beta = 0.063$, p-value = 0.004). However, as represented by goodwill and intangible assets, intellectual capital had a significant negative effect (β=-0.038, p-value= 0.00), indicating that not all intangible investments are properly utilised. The findings showed that firm size significantly moderates the relationship between goodwill and firm value ($\beta = 2.139$, p-value = 0.00) and between net profit per employee and firm value ($\beta = 0.002$, p-value = 0.00). This implied that the size of the firm played a significant role in moderating these relationships, as big banks are in a better position to leverage intellectual and human capital in value creation.

Results: These results emphasised the significance of strategic consistency in managing intangible resources. In practice, the research indicated that it is essential for banks not only to acquire intangible assets but also to integrate and leverage them effectively. It also suggested firm-specific strategies by size to maximise the value obtained from human and intellectual capital in an evolving, knowledge-based industry.

Keywords: Intellectual capital, human capital, firm value, firm size.

1. INTRODUCTION

The US banking sector has experienced significant transformation in recent decades, driven by technological advancement, regulatory changes, and the increasing importance of tangible assets such as intellectual and human capital. The US banking sector has transformed through AI, mobile banking, and RegTech, increasing efficiency and customer experience (Adewumi *et al.,* 2024). Regulatory changes like Dodd-Frank and Basel III strengthened oversight of the banking sector (Hanson *et al.,* 2024). The focus on intellectual and human capital drives innovation and resilience (Agostini & Nosella, 2023). These changes indicate adaptation to technological progress and evolving financial landscapes (Cao *et al.,* 2022). The evolution of the U.S. banking industry is a strategic realignment to innovation, compliance, and talent acquisition to keep banks competitive and strong in a digital and dynamic financial landscape.

The capacity of banks to tap intellectual capital, such as proprietary technologies, patents, data analytics capabilities, and innovation capital, has become important to perpetuate competitive advantage in the fast-changing financial sector of today (Kamukama & Sulait, 2017). Intellectual capital refers to all knowledge assets that promote a firm's competitiveness, for instance, innovation capital, relationship capital, and knowledge capital (Ali & Anwar, 2021; Quintero-Quintero *et al.,* 2021). Such assets are indispensable in creating new

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solutions, niche markets, and sustaining long-term differentiation (Al-Khatib, 2022). Those banks that successfully leverage intellectual capital using cutting-edge technologies and creative strategies outperform industry averages, suggesting a definitive connection between intellectual capital and firm performance (Li & Zhao, 2018). The comprehensive use of intellectual capital allows banks to achieve innovation, strategic market positions, and improved firm performance, making it the key driver of enduring competitiveness in today's financial sector.

Human capital is also very important, as it incorporates the intellectual ability, expertise, experience, and innovative potential of a bank's employees. Human capital plays a critical role in implementing strategies, making effective decisions, and innovation (Tran & Vo, 2020). In Knowledge-Intensive Business Services (KIBS) such as banking, customer service, and financial knowledge being so critical, human capital emerges as a central driver of value creation (Zieba, 2021). Since the industry is becoming more automated and technologically reliant, the role of professional individuals with the ability to adapt and drive change becomes very important (Xu & Li, 2022). Innovation and learning in human capital are hence essential to enable banks to compete in the face of high market dynamism (Soewarno & Tjahjadi, 2020). Human capital, through its knowledge, flexibility, and innovative potential, is critical to ensuring strategic implementation and value addition (Gerhart & Feng, 2021). Therefore, it is a key resource that banks need in an increasingly dynamic, technologically driven business environment.

The purpose of this research is to analyse the independent value contributions of intellectual and human capital for firms within the U.S. banking industry. The key issue that this study addresses is the subpar performance of certain banks as a result of not recognising, and strategically utilising these intangible assets effectively. Banks traditionally focused more on physical assets and technological infrastructure, generally ignoring the strong influence of intellectual and human capital on innovation, competitive strength, and sustainable growth (Ali & Anwar, 2021). By examining the impact of these elements, this study aims to provide inputs that can help banks maximise their intangible assets to improve firm performance and long-term value.

While (Malikah & Nandiroh 2024) are helpful in outlining how intellectual capital is positively related to firm value, their review points out that there remains ambiguity about the contextual factors that can affect this association. In particular, there is limited empirical work examining how the firm size moderates intellectual capital's effect on firm value. Considering large and small banks significantly vary with respect to resource endowment, innovation ability, and strategic intent, the impact of intellectual capital would also differ accordingly. This deficiency is especially significant in knowledge-driven industries such as banking, where intellectual and human capital are key performance drivers. The current research hence contributes to the knowledge by evaluating the moderating effect of the firm size on the intellectual and human capital-firm value relationship and provides more refined findings to guide bank-specific strategies tailored to differently sized banks.

These findings will be especially useful to decision-makers and policymakers who wish to develop appropriate strategies for talent development, innovation expenditure, and knowledge management in the banking industry. With knowledge about how firm size affects the relationship between intellectual and human capital and firm value, stakeholders will be able to develop more targeted and successful methods of resource allocation and strategic planning. Further, this study provides real-world insights into maximising intangible assets in different organisational environments. The research also contributes to the theory development of the resource-based and knowledge-based approaches through contextualising intellectual capital's role within a dynamic, service-oriented, and knowledge-intensive sector such as the banking sector.

2. LITERATURE REVIEW

2.1. Intellectual Capital and Firm Value

The interplay between intellectual capital and firm value can be best understood by applying the Resource-Based View (RBV) and Knowledge-Based View (KBV). RBV suggests that firms derive competitive advantage from specialised, valuable, and imitable internal resources, and intellectual capital is a good example (Ali & Anwar, 2021; Ujwary-Gil, 2017). KBV takes it further by focusing on knowledge as the most strategically valuable resource. Intellectual capital, which includes structural and relational capital, fuels innovation, strategic choice, and effectiveness, all leading to increased firm value (Kengatharan, 2019; Yunita & Prastiwi, 2021). As companies consistently evolve with innovations in technology and the market, the successful deployment and replenishment of intellectual capital become crucial to maintaining long-term value and competitive advantage in knowledge-based industries (Tran & Vo, 2020).

(Li & Zhao 2018) analysed the relationship between intellectual capital and firm value using 1,203 Chinese listed companies with system GMM and IV estimation. They discovered that organisational capital has a positive effect on firm value with a lag. This indicates a subtle relationship between the intellectual capital elements and

firm value. Furthermore, the study of (Nguyen & Doan, 2020) also investigated the relationship between intellectual capital and firm value. The study utilised a sample of 61 Vietnamese manufacturing firms. The results from OLS, random, and fixed effect models reflected a significant and positive relationship between intellectual capital and firm value, providing insights for value-increasing strategies. The study of (Ni *et al.,* 2021) also confirmed that firm value is positively affected by the intellectual capital of the firm in Taiwan. It has been indicated that the intellectual capital of the organisation would provide an advantage for innovation and an excellent reputation that can encourage people to consume and invest more. The findings are also further confirmed by the study of (Appah *et al.,* 2023), which presented that in LQ-45 index companies of Indonesia (which consist of the top 45 Indonesian companies by market cap), intellectual capital has a significant and positive impact. However, the study of (Maditinos *et al.,* 2011) revealed that intellectual capital does not have a significant impact on the relationship between intellectual capital and firm value. Based on these studies, the following hypothesis is developed;

H1: Intellectual capital has a significant and positive impact on the firm value.

2.2. Human Capital and Firm Value

According to Human Capital Theory, expenditure on education, training, and skill acquisition boosts employees' productivity, affecting organisational performance and market valuation directly (Bangara *et al.,* 2024; Özera, 2016). In knowledge-intensive industries, where expertise and innovation create growth, human capital becomes a prime force behind firm value (Kingori, 2025). Therefore, companies that successfully build and utilise human capital are likely to be more successful over the long term (Veltri & Silvestri, 2011). Hence, this theoretical stance supports the positive impact of human capital on firm value.

The study of (Sisodia *et al.,* 2021) evaluated the relationship between human capital and firm value in Indian firms and found a positive relationship between these variables. Human capital increases current and future growth opportunities and declines growth volatility. Furthermore, the study of (Wang & Yu, 2023) have also reflected the positive and significant impact of human capital with firm value. It has been indicated that the knowledge and skills of human capital significantly impact the profitability, which further leads to the increased valuation of the firm in the market and better investor perception. The study of (Ni *et al.,* 2021) also confirmed a positive relationship between human capital and firm value. However, the research of (Li & Zhao, 2018) has not confirmed any significant relationship. Therefore, the following hypothesis is developed based on the discussion above;

H2: Human capital has a positive and significant impact on firm value

2.3. Moderating Effect of Firm Size

Firm size can moderate the association between both intellectual capital and human capital with firm value through various mechanisms based on the Resource-Based View (RBV) and Organisational Theory. Larger firms often have more formalised systems, better access to financial resources, and established processes that can facilitate improving the efficient utilisation of human and intellectual capital (Jordão & Novas, 2017; Ployhart, 2021). For example, in big companies, human capital, which is based on employee skills, knowledge, and experience, can be optimally utilised because of formal training systems, knowledge-sharing mechanisms, and a co-operative organisational culture that together enhance its value contribution to the company (Waititu & Barker, 2022). On the other hand, small businesses do not have the ability to utilise or retain skilled staff fully and thereby undermine the performance impact of human capital (Ni *et al.,* 2021).

Likewise, intellectual capital, including proprietary technologies, patents, and organisational systems, could have varying impact with firm size (Pak *et al.,* 2025). Larger companies are in a more favourable position to capitalise on innovations, enforce intellectual property, and leverage economies of scale, maximising the value extracted from intellectual capital (Sari *et al.,* 2022). Smaller companies might struggle to establish and scale such intangible assets because of low levels of infrastructure and investment capabilities (Malikah & Nandiroh, 2024). Thus, firm size serves as a moderating variable that defines the degree to which human and intellectual capital are realised as enhanced firm value, escalating or limiting their effect based on organisational scale.

H3a: Firm size moderates the relationship between intellectual capital and firm value

H3b: Firm size moderates the relationship between human capital and firm value

3. METHODOLOGY

This research utilises a quantitative research approach to analyse the influence of intellectual and human capital on firm value in the U.S. banking industry. The quantitative research is useful in testing the hypothesis and test cause and effect relationship (Fischer *et al.,* 2023). This method was also adopted by the study of (Akgün & Türkoğlu, 2024; Fitri *et al.,* 2024 and Wang *et al.,* 2021) when evaluating these dynamics. A

secondary data method was utilised, with financial and firm-specific information gathered from Refinitiv, a well-established and commonly used financial information portal. The research targets listed U.S. banks during the period 2010 to 2024 to gain a thorough analysis through varying economic conditions and regulatory regimes.

The original sample was drawn from the largest 50 U.S. banks ranked by total assets, as listed on the S&P Global Market Intelligence website provided by (Villaluz, 2024). This ranking was used as a reference to ensure the sample was comprised of the largest and most representative institutions in the U.S. banking industry. To ensure the study remained relevant and consistent, asset management banks, brokers, and insurance firms were not included because their business models and performance measures are very different from those of conventional commercial banks. The companies with missing data, especially firms with missing data for more than seven years in the study period, were also excluded for the purpose of ensuring data reliability and robustness of analysis. Following the application of these inclusion and exclusion criteria, the sample was 30 New York Stock Exchange (NYSE) listed commercial banks. The filtering ensures that the chosen banks are not only some of the largest and most powerful banks in the U.S. but also have sufficient and stable financial reporting for the duration of the study. This approach allows for a targeted and reliable sample for the evaluation of how intellectual and human capital add value to the firm, while also accounting for sectoral and availability issues, further generalisability and validity of the results.

This research employs various important variables to test the link between intellectual capital, human capital, and the value of the firm, measuring in line with the methodology of (Ni *et al.,* 2021). Intellectual capital is quantified based on goodwill and intangible assets covered by the balance sheet. Such items proxy for the value of non-physical resources such as reputation, patents, and systems that are the keys to the acquisition of competitive advantage. Human capital is quantified in terms of two measures of efficiency: revenue per employee and profit per employee, reflecting the productivity with which a company's human assets generate revenues and profits. The dependent variable, firm value, is measured by Tobin's Q, an estimate of the ratio of the market value of a firm to the book value of its assets and a reflection of investor expectations of company performance (Ghani *et al.,* 2023). Firm size, the moderating variable, is only measured using the natural logarithm of total assets so that firms of varying sizes may be compared in a comparable, and normalised scale. Two control variables are also used to account for financial structure: the debt-to-equity ratio, which captures the firm's level of leverage, and the debt-to-assets ratio, which captures the percentage of assets that are financed using debt. These specifications in combination enable a strong examination of how intellectual and human capital impact firm value for firms of different sizes. Table **1** below shows the variable measurement of the variables along with source from which data was obtained.

Panel data regression analysis is used in the study to investigate intellectual and human capital's association with firm value over time among different firms. Both Fixed Effects Model (FEM) and Random Effects Model (REM) are used to control for unobserved heterogeneity (Pesaran, 2015). The Hausman test is used to ascertain the better model between REM and FEM. Heteroscedasticity and autocorrelation diagnostic tests are used to check for the validity of the model (Mátyás & Sevestre, 2013). According to the existence of these problems, the research utilises the Generalized Least Squares (GLS) model, which adjusts for heteroscedasticity and autocorrelation, yielding more efficient and accurate coefficient estimates.

Table 1. Variable measurement.

Variable	Type	Measurement	Source	Reference
Intellectual Capital	Independent	Goodwill + Intangible Assets	Refinitiv	(Ni *et al.,* 2021)
Human Capital	Independent	Revenue per Employee, Profit per Employee		
Firm Value	Dependent	Tobin's Q (Market Value / Book Value of Assets)		
Firm Size	Moderator	Natural Log of Total Assets		
Debt to Equity	Control	Total Debt / Shareholders' Equity		
Debt to Assets	Control	Total Debt / Total Assets		

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4. METHOD

4.1. Descriptive Statistics

Table **2** shows descriptive statistics of the variables with significant implications for firm performance in U.S. banking. Operating revenue per employee has a mean of $299,022 million and a standard deviation of $219,572 million, reflecting considerable heterogeneity in bank employee productivity. This indicates that some banks might be more efficient at utilising human capital compared to others. Net profit per employee likewise has a high variance, with an average of $78,579 million and standard deviation of $64,931 million, thereby potentially revealing profitability variances through managerial efficiency or effective workforce.

Table 2. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Operating Revenue per employee ($ million)	450	299,022.90	219,572.70	-7,500.84	209,1920.00
Net Profit per employee ($ million)	450	78,579.65	64,931.63	-142,241.80	690,517.80
Goodwill ($ million)	450	9,671.81	1,2803.90	0.00	63,440.93
Debt to Equity (%)	450	170.87	126.02	11.32	721.42
Tobin's Q	450	0.25	0.16	-0.23	0.90
Debt to Assets (%)	450	0.89	0.03	0.81	0.96
Firm Size	450	12.20	1.33	9.46	14.98

Goodwill as a measurement of the intellectual capital also reflects a mean of $9,671 million and a standard deviation of $12,803 million, indicating a difference in investment in intangible assets and possibly inducting innovation capacity and competitive ability. Debt to equity demonstrates high mean value of 170.87% and standard deviation of 126.02%, indicating varying risk preferences and financial approaches. Tobin's Q, at mean 0.25 and standard deviation 0.16, imply that the firms are undervalued. Debt to assets indicates minimal variability with mean 89%, and standard deviation of 3%, showing significant proportion of asset financing through debt. Firm size has mean of 12.20 with standard deviation of 1.33 possesses moderate variability, suggesting size differentials in capital utilisation and strategic ability. These results highlight the imperative for banks to better manage intellectual and human capital in order to improve firm value.

4.2. Correlation Analysis

Table **3** correlation analysis identifies a number of strong relationships between the study variables. Goodwill is positively and significantly correlated with size (r=0.7840), which means that big banks contain more intangible assets, probably as a result of acquisitions and the build-up of brand values. Net profit per employee is positively and significantly correlated with Tobin's Q (r=0.1505), which implies that higher human capital efficiency is linked with higher value for the firm. Operating revenue per employee also shows positive and significant correlations with Tobin's Q (r=0.2571) and debt to equity (r=0.4694), implying that higher employee productivity can influence both market valuation and financial leverage. Interestingly, Tobin's Q has a negative correlation with debt to assets (r= -0.254) and firm size (r= -0.1408*), suggesting that higher leverage and larger size may be viewed less favourably by the market. The weak and significant correlation between goodwill and Tobin's Q (r= -0.1847) might imply that not all intangible assets directly translate into firm value. These results underscore the complex interactions between intangible assets, financial structure, and firm value, with human capital efficiency emerging as a more consistent positive contributor.

Table 3. Correlation analysis.

	Goodwill	Net Profit Per Employee	Operating Revenue Per Employee	Debt to Assets	Firm Size	Tobin's Q
Net Profit per employee	-0.0311	1				
Operating Revenue per employee	0.0593	0.2006***	1			
Debt to Assets	-0.0115	0.0459	0.1484***	1		
Firm Size	0.7840***	0.0821	0.2719***	0.3887***	1	
Tobin's Q	-0.1847***	0.1505***	0.2571***	-0.254***	-0.1408***	1
Debt to Equity	0.0024	0.1565***	0.4694***	0.2463***	0.2728***	0.5621***

Note: ****: significance at 1%, **: significance at 5%, *Significance at 10%*

4.3. Panel Data Analysis

Table **4** above shows the findings of panel data tests for Random Effects, Fixed Effects, and Generalized Least Squares (GLS) models to establish the effect of intellectual and human capital on firm value as indicated by Tobin's Q. The Hausman test value (0.884) indicates that the Random Effects model is suitable, but as a consequence of heteroscedasticity (*p*-value = 0.000) and autocorrelation (*p*-value = 0.000), the GLS model is considered more preferable to interpret.

In GLS, goodwill has a strong negative impact on firm value (B = -0.038, *p*-value= 0.000), which indicates that not all intangibles, especially those acquired, add to value. Operating revenue per employee, a measure of human capital productivity, is significantly and positively impacting on the firm value (B = 0.063, *p*-value = 0.004), which means that the efficiency of employees is a very important driver in adding value to the firm.

Debt to assets has a significant negative impact on firm value in all models, implying that more leverage can dampen investors' confidence. Firm size, although not significant in RE and FE models, has a weak positive impact in GLS (B = 0.001, -value = 0.000). The findings shows that firm size significantly moderate the relationship between goodwill and firm value (B= 2.139, *p*-value = 0.00). It also shows significant moderating effect of firm size between net profit per employee and firm value (B= 0.002, *p*-value = 0.00). However, firm size does not moderate the relationship between revenue per employee and firm value (B= 0.002, *p*-value = 0.00).

5. DISCUSSION

The purpose of this study is to evaluate the impact of intellectual capital and human capital on firm value. It shows that intellectual capital is negatively and significantly related with the firm value. However, it does not support the current literature. The contrasting results on how intellectual capital affects firm value are due to some contextual and methodological considerations. Although (Appah *et al.,* 2023; Li & Zhao, 2018; and Nguyen & Doan, 2020) documented a positive and significant correlation, the research indicates a negative and significant influence. A plausible explanation is the variations in industry setting or market development; for example, knowledge industries in developing countries can utilise IC more efficiently to create value. Furthermore, differences in measuring methods, temporal lags, and econometric models (such as GMM *versus* OLS) can produce results that differ. The Resource-Based View (RBV) and Knowledge-Based View (KBV) highlight the strategic significance of IC, which is contingent on how it is utilised and integrated by firms. Negative performance can be an indication of inadequate IC management or strategic misalignment, implying that IC in itself is not value-guaranteeing unless properly utilised and replenished. For U.S. banks, the results emphasise strategically managing intellectual capital. Having knowledge assets is not enough; banks need to position intellectual capital in alignment with organisational objectives, innovation, and customer value. Successful integration and use of IC can boost competitiveness, while management failure can undermine firm value in the presence of abundant resources.

The research finding of a positive and significant contribution of human capital to firm value supports Human Capital Theory, which states that expenditure on education, training, and skill development increases the productivity of employees and thus firm performance and market value. This is especially true for knowledge industries where employee competence generates innovation and competitive success. Furthermore, (Sisodia *et al.,* 2021) supports the findings by indicating that human capital in Indian companies not only enhances

firm value but also anchors growth. Likewise, (Wang & Yu, 2023) reiterated that the knowledge and abilities contained in human capital lift profitability, which has a positive effect on investor sentiment and firm valuation. (Ni *et al.,* 2021) also supported these results in the Taiwanese environment. Yet, (Li & Zhao, 2018) found no significant connection. The study's lack of significance can be due to China's distinct institutional and labour environments, where human capital could be wasted. Their application of conservative econometric techniques and focus on lag effects could have hidden short-term effects, leading to the deviation from other research with positive relations. In conclusion, the evidence is in agreement that successful development and use of human capital are essential to long-term success and sustainable value creation.

Table 4. Panel data analysis and robustness test.

	Random Effect		**Fixed Effect**		**GLS**	
	Coeff	***P*-value**	**Coeff**	***P*-value**	**Coeff**	***P*-value**
Goodwill	0.085**	0.025	0.105***	0.010	-0.038***	0.000
Net Profit per employee	-0.022	0.580	-0.025	0.536	-0.019	0.429
Operating Revenue per employee	0.008	0.923	-0.001	0.995	0.063***	0.004
Debt to Assets	-2.614***	0.000	-2.615***	0.000	-2.419***	0.000
Firm Size	-0.029	0.669	-0.039	0.582	0.001***	0.000
Debt to Equity	0.001***	0.000	0.001***	0.000	-0.004***	0.005
FS*RE	0.001	0.893	0.002	0.780	0.002	0.183
FS*OP	0.002	0.484	0.003	0.445	0.002***	0.000
FS*Goodwill	-0.006*	0.056	-0.008**	0.026	2.139***	0.000
Cons	2.422***	0.003	2.483***	0.003	-0.038***	0.000
R-Squared	0.435		0.420			
Hausman Test	4.39					
Heteroskedasticity	1592.89***					
Autocorrelation	31.196***					

Note: *FS*RE = Firm size X revenue per employee, FS*OP = Firm size X profit per employee, FS* Goodwill = Firm size* Goodwill*
****: significance at 1%, **: significance at 5%, *Significance at 10%*

The study findings indicates that firm size strongly moderates the human and intellectual capital-firm value relationship, as postulated by the Resource-Based View (RBV) and Organisational Theory. Larger firms, with formal systems and more resources, are better positioned to forge, utilise, and retain high-quality human capital and utilise intellectual capital for innovation and efficiency. They enjoy formal training, strong knowledge-sharing, and legal intangible asset protection, leading to higher value creation. For comparison, small companies tend to have fewer of these capabilities, constraining them from capitalising on these resources. Firm size, therefore, affects how efficiently these capitals become competitive advantage and firm performance.

CONCLUSION

The study was conducted to investigate the impact of intellectual and human capital on firm value in US banks along with moderating role of firm size. This research finds that human capital has a significant and positive influence on firm value, whereas intellectual capital illustrates a negative correlation with firm value within the U.S. banking industry. Such evidence indicates that although employees' productivity and efficiency are imperative drivers of value, the existence of intangible assets such as goodwill and patents does not necessarily imply improved firm performance. Rather, strategic leveraging of these assets is imperative. Moreover, the research discovers that firm size is a moderator in both

associations. Larger banks have the ability to take advantage of both intellectual and human capital more effectively because they enjoy stronger infrastructure, resources, and formalised procedures. This indicates that advantages of intangible assets are not equally redistributed and significantly rely on organisational context and size.

It has clear practical implications. American banks need to pay attention to investing in human capital formation through training, innovation capability, and incentive compensation. At the same time, they need to move beyond simply purchasing intellectual assets and put emphasis on their seamless integration into strategic and operational activities. For policymakers and regulators, the results reaffirm the necessity for size-differentiated approaches to fostering innovation and talent growth in banks. Strategies specially designed to address the specific needs and capabilities of small in contrast to large banks can promote enhanced resource fit and overall sector performance.

LIMITATIONS AND FUTURE RECOMMENDATIONS

This research, though giving useful insights, has a few limitations. In the first place, it is based only on secondary data, which do not necessarily reflect the full sophistication of intellectual and human capital, particularly qualitative factors like employee motivation or innovation culture. The proxies employed (goodwill, revenue per employee) may also capture these intangible resources in oversimplified ways. Second, the research only considers large, listed U.S. banks, which might limit generalisability to smaller banks or non-U.S. settings. Third, the cross-sectional design, while covering more than one year, cannot yet reveal the full long-run impact and dynamic development of intangible assets.

Future research may overcome some of these limitations through the use of qualitative techniques or survey data to identify richer insights into the development and utilisation of intellectual and human capital. Both the extension of the study to smaller banks or cross-border comparisons would also provide wider applicability. Lastly, longitudinal case studies might further investigate how shifts in intangible asset management affect a firm's performance through time.

AUTHOR'S CONTRIBUTION

The entire work including conceptualization, methodology, analysis, software work, writing, and editing/proofreading before final submission was done by A.S.

ETHICAL APPROVAL FOR HUMAN PARTICIPANTS

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

The data will be made available on reasonable request by contacting the corresponding author [A.S.].

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

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REFERENCES

Adewumi, A., Ewim, S. E., Sam-Bulya, N. J., & Ajani, O. B. (2024). Advancing business performance through data-driven process automation: A case study of digital transformation in the banking sector. *International Journal of Multidisciplinary Research Updates*, *8*(02). https://doi.org/10.53430/ijmru.2024.8.2.0049.

Agostini, L., & Nosella, A. (2023). Intellectual capital and resilience: evidence from two cases of SMEs. *Knowledge Management Research & Practice*, *21*(5), 929-942. https://doi.org/10.1080/14778238.2022.2103047.

Akgün, A. İ., & Türkoğlu, S. P. (2024). Intellectual capital and performance of listed firms during the global financial crisis: the effects of legal origin. *International Journal of Organizational Analysis*, *32*(4), 759-785. https://doi.org/10.1108/IJOA-01-2023-3587.

Ali, B. J., & Anwar, G. (2021). Intellectual capital: A modern model to measure the value creation in a business. *Intellectual capital: A modern model to measure the value creation in a business. International journal of Engineering, Business and Management*, *5*(2), 31-43. https://dx.doi.org/10.22161/ijebm.5.2.4.

Al-Khatib, A. W. (2022). Intellectual capital and innovation performance: the moderating role of big data analytics: evidence from the banking sector in Jordan. *EuroMed Journal of Business*, *17*(3), 391-423. https://doi.org/10.1108/EMJB-10-2021-0154.

Appah, T. R., Yuniarti, S., Sisharini, N., Sunarjo, S., & Yahya, N. (2023). Does profitability matter in the relationship between intellectual capital and firm value? *Media Ekonomi Dan Manajemen*, *38*(1), 57-70. https://eprints.unmer.ac.id/id/eprint/3664.

Bangara, S. N., Chesoli, J. W., Ngacho, C., & Nyanga'u, A. (2024). Human capital disclosure and firm value: An investigation of Kenyan and South African listed companies. *Sch J Econ Bus Manag*, *9*, 242-256. https://doi.org/10.36347/sjebm.2024.v11i09.001.

Cao, J., Law, S. H., Samad, A. R. B. A., Mohamad, W. N. B. W., Wang, J., & Yang, X. (2022). Effect of financial development and technological innovation on green growth—analysis based on spatial Durbin model. *Journal of Cleaner Production*, *365*, 132865. https://doi.org/10.1016/j.jclepro.2022.132865.

Fischer, H. E., Boone, W. J., & Neumann, K. (2023). Quantitative research designs and approaches. In *Handbook of research on science education* (pp. 28-59). Routledge. https://www.taylorfrancis.com/chapters/edit/10.4324/9780367855758-3/quantitative-research-designs-approaches-hans-fischer-william-boone-knut-neumann.

Fitri, R. K., Nurabiah, N., & Priyambodo, V. K. (2024). Does financial technology moderate the relationship between intellectual capital and company performance? Empirical study in Indonesian banking. *New Applied Studies in Management, Economics & Accounting*, *7*(1), 79-97. 10.22034/nasmea.2024.181581.

Gerhart, B., & Feng, J. (2021). The resource-based view of the firm, human resources, and human capital: Progress and prospects. *Journal of management*, *47*(7), 1796-1819. https://doi.org/10.1177/0149206320978799.

Ghani, R. A., Samah, A. R. A., Baharuddin, N. S., & Ahmad, Z. (2023). Determinants of firm value as measured by the Tobin's Q: a case of Malaysian plantation sector. *Int J Acad Res Account Financ Manag Sci*, *13*(2), 420-432. http://dx.doi.org/10.6007/IJARAFMS/v13-i2/17268.

Hanson, S. G., Ivashina, V., Nicolae, L., Stein, J. C., Sunderam, A., & Tarullo, D. K. (2024). The evolution of banking in the 21st century: Evidence and regulatory implications. *Brookings Papers on Economic Activity*, *2004*(1), 343-389. 10.1353/eca.2024.a943918.

Jordão, R. V. D., & Novas, J. C. (2017). Knowledge management and intellectual capital in networks of small-and medium-sized enterprises. *Journal of intellectual capital*, *18*(3), 667-692. https://doi.org/10.1108/JIC-11-2016-0120.

Kamukama, N., & Sulait, T. (2017). Intellectual capital and competitive advantage in Uganda's microfinance industry. *African Journal of Economic and Management Studies*, *8*(4), 498-514. https://doi.org/10.1108/AJEMS-02-2017-0021.

Kengatharan, N. (2019). A knowledge-based theory of the firm: Nexus of intellectual capital, productivity and firms' performance. *International journal of manpower*, *40*(6), 1056-1074. https://doi.org/10.1108/IJM-03-2018-0096.

Kingori, G. (2025). Human Capital Disclosure and Firm Value; Does Audit Committee Size Matters. Evidence from Listed Firms in Nairobi Securities Exchange, Kenya. https://doi.org/10.53819/81018102t7044.

Li, Y., & Zhao, Z. (2018). The dynamic impact of intellectual capital on firm value: evidence from China. *Applied Economics Letters*, *25*(1), 19-23. https://doi.org/10.1080/13504851.2017.1290769.

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. https://doi.org/10.1108/14691931111097944.

Malikah, A., & Nandiroh, U. (2024). Intellectual capital and value of the firm: a systematic literature review. *International Journal Of Humanities Education and Social Sciences*, *3*(4). https://doi.org/10.55227/ijhess.v3i4.777.

Mátyás, L., & Sevestre, P. (Eds.). (2013). *The econometrics of panel data: handbook of theory and applications* (Vol. 28). Springer Science & Business Media.

Nguyen, A. H., & Doan, D. T. (2020). The impact of intellectual capital on firm value: Empirical evidence from Vietnam. *International Journal of Financial Research*, *11*(4), 74-85. 10.5430/ijfr.v11n4p74.

Ni, Y., Cheng, Y. R., & Huang, P. (2021). Do intellectual capitals matter to firm value enhancement? Evidences from Taiwan. *Journal of Intellectual Capital*, *22*(4), 725-743. https://doi.org/10.1108/JIC-10-2019-0235.

Özera, G. (2016). The role of human capital in firm valuation: an application on BIST. https://doi.org/10.1016/j.sbspro.2016.11.012.

Pak, A., Seo, D. J., & Roh, T. (2025). The effect of intellectual property rights on firm performance in service firms: the role of process and organizational innovation. *Cross Cultural & Strategic Management*, *32*(1), 49-76. https://doi.org/10.1108/CCSM-08-2023-0163.

Pesaran, M. H. (2015). *Time series and panel data econometrics*. Oxford University Press.

Ployhart, R. E. (2021). Resources for what? Understanding performance in the resource-based view and strategic human capital resource literatures. *Journal of Management*, *47*(7), 1771-1786. https://doi.org/10.1177/01492063211003137.

Quintero-Quintero, W., Blanco-Ariza, A. B., & Garzón-Castrillón, M. A. (2021). Intellectual capital: A review and bibliometric analysis. *Publications*, *9*(4), 46. https://doi.org/10.3390/publications9040046.

Sari, D. K., Hermawan, S., Fitriyah, H., & Nurasik, N. (2022). Does Profitability, Firm Size, and Intellectual Capital Affect Firm Value?. *Jurnal Riset Akuntansi Terpadu*, *15*(2), 195-209. http://dx.doi.org/10.35448/jrat.v15i2.16813.

Sisodia, G., Jadiyappa, N., & Joseph, A. (2021). The relationship between human capital and firm value: Evidence from Indian firms. *Cogent Economics & Finance*, *9*(1), 1954317. https://doi.org/10.1080/23322039.2021.1954317.

Soewarno, N., & Tjahjadi, B. (2020). Measures that matter: an empirical investigation of intellectual capital and financial performance of banking firms in Indonesia. *Journal of Intellectual Capital*, *21*(6), 1085-1106. https://doi.org/10.1108/JIC-09-2019-0225.

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.

Ujwary-Gil, A. (2017). The business model and intellectual capital in the value creation of firms: A literature review. *Baltic Journal of Management*, *12*(3), 368-386. https://doi.org/10.1108/BJM-10-2016-0224.

Veltri, S., & Silvestri, A. (2011). Direct and indirect effects of human capital on firm value: evidence from Italian companies. *Journal of Human Resource Costing & Accounting*, *15*(3), 232-254. https://doi.org/10.1108/14013381111178596.

Villaluz, Z. G. (2024). 50 largest US banks by total assets, Q3 2024. Retrieved from https://www.spglobal.com/market-intelligence/en/news-insights/articles/2024/12/50-largest-us-banks-by-total-assets-q3-2024-86449795.

Waititu, P., & Barker, R. (2022). Organisational factors as determinants for online knowledge-sharing behaviour: a Kenyan case study. *Communicare: Journal for Communication Sciences in Southern Africa*, *41*(1), 77-89. https://hdl.handle.net/10520/ejc-comcarev41n1a7.

Wang, X., & Yu, J. (2023). Accumulating human capital: Corporate innovation and firm value. *International review of finance*, *23*(4), 750-776. https://doi.org/10.1111/irfi.12422.

Wang, Z., Cai, S., Liang, H., Wang, N., & Xiang, E. (2021). Intellectual capital and firm performance: the mediating role of innovation speed and quality. *The International Journal of Human Resource Management*, *32*(6), 1222-1250. https://doi.org/10.1080/09585192.2018.1511611.

Xu, J., & Li, J. (2022). The interrelationship between intellectual capital and firm performance: evidence from China's manufacturing sector. *Journal of intellectual capital*, *23*(2), 313-341. https://doi.org/10.1108/JIC-08-2019-0189.

Yunita, W., & Prastiwi, D. (2021). Effect of intellectual capital on firm value. *International Journal of Economics, Business and Management Research*, *5*(06), 1-12. https://ijebmr.com/uploads/pdf/archivepdf/2021/IJEBMR_757.pdf.

Zieba, M. (2021). *Understanding knowledge-intensive business services*. Springer International Publishing. https://doi.org/10.1007/978-3-030-75618-5_3.