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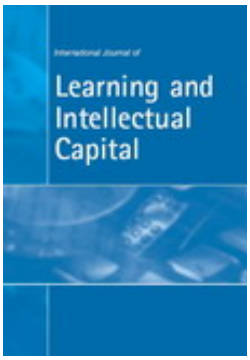

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Mohammad Suleiman Awwad, Ali Muhammad Qtaishat

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The impact of intellectual capital on financial performance of commercial banks: the mediating role of competitive advantage

Mohammad Suleiman Awwad*

Business Department,
Faculty of Business,
Mutah University,
Karak, 61710, Jordan
Email: awwad@mutah.edu.jo
*Corresponding author

Ali Muhammad Qtaishat

Auditing Department,
Cairo Amman Bank,
Amman, 11195, Jordan
Email: ali.qtaishat@hotmail.com

Abstract: The purpose of this study is to investigate the impact of intellectual capital on the financial performance of Jordanian commercial banks and the mediating role of competitive advantage. The value-added intellectual coefficient (VAIC™) model was used to measure intellectual capital; asset utilisation ratio to measure competitive advantage; and return on assets to measure commercial banks' performance. This empirical research was conducted using panel data from the financial reports of 13 Jordanian commercial banks listed on the Amman Stock Exchange for the period 2009–2018. Data analysis was achieved using STATA 15. The findings indicate that intellectual capital and competitive advantage positively impact the financial performance of commercial banks. Also, competitive advantage mediates the relationship between intellectual capital and financial performance. In this context, intellectual capital plays a significant role in creating value for a firm's stakeholders and developing a competitive advantage that enables the firm to face the increasing competition, especially in the banking sector.

Keywords: value-added intellectual coefficient; VAIC™; intellectual capital; value-added; competitive advantage; financial performance; assets utilisation ratio; return on assets; ROA; commercial banks.

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Biographical notes: Mohammad Suleiman Awwad is a Full Professor of Business and Marketing at Mutah University. He received his BA in Business and Statistics (1990), MBA (1994), and PhD in Business/Marketing (2004). His research interests are in knowledge management, organisational behaviour, human resource management, entrepreneurship, and marketing.

Ali Muhammad Qtaishat is an Audit Team Leader, and has a Master of Business Administration (MBA) from Mutah University. He is an employee of the Cairo Amman Bank, and his research interests are in the fields of organisational behaviour and marketing.

1 Introduction

With the rapid technological progress in the current era, especially information and communication technology, economic liberalisation, privatisation, and globalisation, banks are now facing intense competition, whether in the local or global market. To face this intense competition and continue to achieve growth and prosperity and achieve superiority in financial performance over competitors, it first needs to achieve a sustainable competitive advantage (CA) that enables it to outperform competitors. To establish a CA over competitors and create value for the organisation, corporations in the past had to acquire various tangible assets, including machinery, equipment, buildings, inventory, cash, vehicles, and investments, regardless of the monetary value of the company's intangible assets.

However, these tangible assets have become unable to achieve a sustainable CA for the company because they are easily obtained or imitated by competitors. This situation has forced companies to consider the intangible strategic assets that their competitors cannot imitate or quickly acquire, such as knowledge, experience, technology, and relationships, which constitute the so-called intellectual capital (Mondal and Ghosh, 2012). Knowledge, information, experience, research and development, relationships, and attitude towards stakeholders, which is called intellectual capital, play a dominant role in achieving a company's CA (Weqar and Haque, 2020). Banks are service companies operating in a knowledge-based economy where there is a great deal of similarity in the services provided, distribution channels, and interest rate profits, which has drawn banks' attention to intangible resources that make up intellectual capital, such as knowledge, employee skills, service quality, social relations, and image, as well as innovations (Anielak-Sobczak, 2022).

Because of the changing conditions related to the banking services market in the 21st century, we need to reconsider the activities that build the competitiveness of banks, especially considering the development of the concept of intellectual capital (Ozkan et al., 2017). Galbraith (1969) is considered the first to introduce the concept of intellectual capital and define it as 'the intangible asset of a firm'. Since then, this concept has been given more attention by researchers and practitioners due to the vital role that intellectual capital plays in real life (Lin et al., 2015). Intellectual capital has been viewed as 'hidden' or 'invisible' capital, since accounting, with its legal and financial basis principles and practices, does not take it into account or reflect it in the financial statements (Inkinen, 2015). Today, banks use intellectual capital as much as they use financial capital (Klimontowicz, 2019). Companies are increasingly interested in

intellectual capital, which comprises human, structural, and relational capital, as opposed to traditional tangible assets (Bontis et al., 2000).

When the company owns a set of intangible strategic assets that are scarce and difficult to imitate and obtain easily by competitors or find a substitute for them (Barney, 1996; Stiles and Kulvisaechana, 2004), such as human capital (skills, knowledge, basic competencies, and experience of each employee) (Anuonye, 2015; Secundo et al., 2015), relational capital (relationships with suppliers, competitors, customers, employees, and other stakeholders) (Kanchana and Mohan, 2017; Chu et al., 2011; Secundo et al., 2015), and structural capital (organisational structure and systems for managing employees, assets, financial resources, products, services, customers, and suppliers) (Secundo et al., 2015), this will enhance the company's ability to achieve superiority over competitors (CA) and financial performance above the industry average (Porter, 1985).

The concept of intellectual capital is considered one of the factors that precede the achievement of a sustainable CA, which in turn leads to improving the level of the financial performance of these organisations (Hsu and Fang, 2009). This is consistent with the resource-based view (Barney, 1996), which claims that organisations' resources, especially intangible resources, are likely to contribute to achieving greater organisational performance and maintaining that performance (Eisenhardt and Schoonhoven, 1996). Therefore, resources of an intangible nature, reflected in intellectual capital, are one of the main sources of creating a sustainable CA for a company and generating value and future performance for organisations (Lev, 2001; Rochmadhona et al., 2018; Li et al., 2016). The strategy of excellence adopted by the company can only be achieved through intellectual capital represented by creativity and creative ideas, thus providing new products and services that will positively affect the financial performance of the organisation and strengthen its competitive position in the local and global markets (Rochmadhona et al., 2018). As a result, the study's objective is to determine the relationship between intellectual capital and financial performance, as well as the role of CA as a mediator variable.

2 Problem statement

Ting et al. (2020) indicate that the nature of the relationship between intellectual capital and the financial performance of the company is still unclear, as studies have revealed conflicting results about whether the relationship is significant or not. For example, some scholars indicated the existence of a relationship (Chen et al., 2005; Tan et al., 2008; Clarke et al., 2011), while others indicated no relationship (Firer and Williams, 2003; Ho and Williams, 2003; Chan, 2009). On the other hand, previous studies have shown inconsistencies in the mediating role of CA in the relationship between intellectual capital and financial performance. Some scholars indicated the importance of CA as a mediating variable (Aslam et al., 2013; Ibarra-Cisneros et al., 2020; Kamukama et al., 2011; Mulyasari and Murwaningsari, 2019; Pratama and Achmad, 2015; Rochmadhona et al., 2018), while others indicated that this variable does not mediate the relationship between intellectual capital and financial performance (Lubis and Muchtar, 2019; Suripto, 2019; Nugroho, 2019).

The current study will contribute to clarifying the debate related to the nature of the relationship between intellectual capital and financial performance and the mediating role

of CA in this relationship. In other words, this study will attempt to answer the following questions:

1 What is the impact of intellectual capital on the financial performance of Jordanian commercial banks?

2 What is the impact of intellectual capital on the CA of Jordanian commercial banks?

3 What is the mediating impact of CA on the relationship between intellectual capital and financial performance of Jordanian commercial banks?

3 Literature review

Literature indicates several definitions of intellectual capital. For example, it is an intangible asset that creates value for the company and is generated through innovation, organisational practices, human resources, or a combination of these sources, which can be incorporated into physical and financial assets (Lev, 2001), the company's ability to create, implement, and measure its intangible resources to create value, which enhances the growth of the company's practices and performance (Dean and Kretschmer, 2007), the sum of the knowledge of its members (Roos et al., 2001), and the intellectual property, knowledge, experience, ownership, and information that can be used to create value (Dumay, 2016).

Most researchers agree that intellectual capital is a multidimensional concept, used to describe intangible assets and includes human capital, relational capital, and structural capital (Tovstiga and Tulugurova, 2009; Bontis, 2002; Stewart, 2001; Bontis et al., 2000). *Human capital* refers to the intangible resources that come from the people involved with the company, as well as their professional experience, abilities, skills, talents, motivation, creativity, knowledge, intelligence, commitment, and ability to solve problems (Anuonye, 2015; Secundo et al., 2015). *Structural capital* relates to the company's technological capital and infrastructure, which is its property and provides value, such as organisational technology (procedures, systems, and databases), clear knowledge, intellectual property, ability to innovate, culture, organisational policies, structure, formal and informal planning and control systems, trademarks, patents, etc. (Kanchana and Mohan, 2017; Chu et al., 2011; Secundo et al., 2015). *Relational capital* includes relationships with the environment, especially with the economic agents that participate in the different phases of the product value chain (suppliers, competitors, and customers). Therefore, this capital represents the added value created by the company as an agent in a continually changing environment (Secundo et al., 2015).

All the above definitions indicate that intellectual capital enhances a firm's CA. 'CA' is the ability of an organisation to continuously earn returns on investment above the industry average (Porter, 1985). Stiles and Kulvisaechana (2004) argued that a company is said to have a CA when it has valuable organisational resources that are rare, very difficult to imitate, and cannot be replaced significantly. A company that has a unique value can drive the market as it is easy for the customer to identify. The CA in this study will be expressed through the asset utilisation rate, which evaluates the company's effectiveness in using its assets to compete and generate profit (Gani and Jermias, 2006; Hapsari, 2018). According to resource-based theory (Barney, 1996), if the company has a CA, it can achieve superior performance. Financial performance is one of the measures

used to measure the quality of a company. Measurement of company performance is needed to determine whether the company's performance is good or bad. Financial performance, measured by return on assets (ROA), is an indicator of how profitable the company is relative to its total assets. ROA gives shareholders or analysts an idea of how efficiently the company's management is using its assets to generate profits (Hapsari, 2018).

4 Hypotheses development

According to resource-based theory (Barney, 1996), CA will be created if the company is able to process its resources efficiently and effectively. The superior resources contained in the company's intellectual assets (intellectual capital) will produce a CA for the company. According to Wang and Chang (2005), intellectual capital is the most important indicator of a firm's future value and competitiveness today and in the future. Intellectual capital has been increasingly recognised as an important strategic asset for achieving sustainable CA for organisations (Chen et al., 2005). Intellectual capital meets the criteria as a unique resource to create a CA for companies to obtain the added value of the company (Montequín et al., 2006). Managing intellectual capital that produces added value will increase the CA of the company. This indicates that the greater the value of intellectual capital, the greater the CA of the firm. This statement is consistent with several previous studies (Kamukama et al., 2011; Olarewaju and Msomi, 2021; Zakery and Saremi, 2021; Igielski, 2018; Isada and Isada, 2019; Yaseen et al., 2016), which demonstrates that intellectual capital has a positive impact on a company's CA and is also supported by the research of Wu and Sivalogathasan (2013), which states that intellectual capital has a positive impact on a company's competitiveness. Based on the above, the following hypothesis can be proposed:

H1 Intellectual capital has a positive impact on the CA of commercial banks.

Intellectual capital enables the firm to be able to process and maximise the use of its resources efficiently and effectively, which can increase the profits of the firm so that it can better use its intellectual capital and increase its level of profitability and investor confidence. This will encourage firms to continue developing resources in an integrated periodic form to be able to outpace the market competition and thus increase the organisation's performance (Handayani and Karnawati, 2019; Wah et al., 2011; Mehri et al., 2013). Several previous studies (Sardo and Serrasqueiro, 2018; Xu and Wang, 2018; Vidyarthi, 2019; Khalique et al., 2020; Xu and Li, 2019; Xu et al., 2020; Weqar et al., 2021) supported the notion that intellectual capital has a positive impact on a company's performance. Based on the above, the following hypothesis can be proposed:

H2 Intellectual capital has a positive impact on the financial performance of commercial banks.

CA enhances superior performance, determines profitability, and affects financial performance (Cao et al., 2014; Rochdi et al., 2017; Sar, 2017). Based on the resource-based theory, the superior performance of a firm depends on the existence of CA based on value, scarcity, unavailability of substitutes, or imitability (Wijayanto et al., 2019). Several previous studies (Potjanajaruwit, 2018; Nguyen et al., 2021; Nguyen and

Khoa, 2020; An and Kim, 2019; Mulyasari and Murwaningsari, 2019) demonstrated the positive relationship between CA and performance. Based on the above, the following hypothesis can be proposed:

H3 CA has a positive impact on the financial performance of commercial banks.

Resource-based theory indicates that companies can achieve a CA if they manage their resources well, especially the intangible resources represented by intellectual capital (Barney, 1996). These resources will greatly influence the future performance of these companies. A company that possesses intellectual capital and can manage it well will be able to gain a CA, which will lead to outstanding performance in the future. Within the framework of resource-based theory, intellectual capital contributes to improving CA by creating value for resources and unique capabilities (Cheng et al., 2010). Several scholars have indicated that the more efficient companies are in managing intellectual capital, the more quickly they can achieve a CA, which will positively affect the level of performance of these companies (Kamukama et al., 2011; Widyaningdyah and Aryani, 2013; Firer and Williams, 2003; Shiu, 2006; Choudhury, 2010; Khani et al., 2011; Ana et al., 2021). The effective management and use of intangible assets enhances the company's ability to achieve CA and increase market penetration which leads to attracting more valuable clients and leads to better financial performance in the future (Olarewaju and Msomi, 2021). Bontis et al. (2000) indicates that investment in intellectual capital, specifically structural capital, leads to a greater CA. Investing in human capital or relational capital will cause flow-on effects on performance through structural capital. This means that the firm's CA can be a mediator between the intellectual capital and the performance of the firm. Based on the above, the following hypothesis can be proposed:

H4 CA mediates the impact of intellectual capital on the financial performance of commercial banks.

Figure 1 Study model

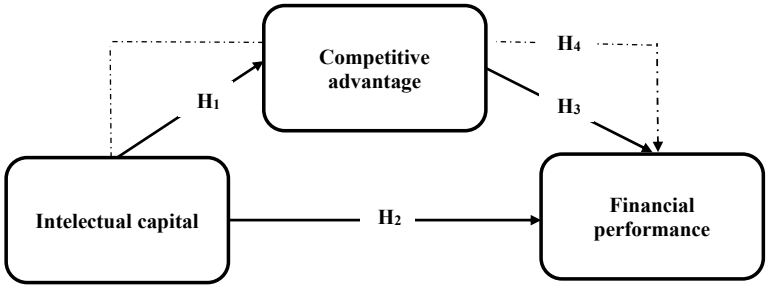


Figure 1 represents the study model, which will be tested based on the data gathered from the annual financial statements of commercial banks listed on the Amman Stock Exchange.

5 Design and methodology

This study adopts longitudinal and quantitative research designs to investigate the hypotheses. The commercial banks listed on the Amman Stock Exchange represent the current study population, whose number as of 2018 is 13 banks. The required data from all these banks were obtained from the annual financial reports published on the Jordan Securities Commission website for the years from 2009 to 2018. The data in this study represents panel data; therefore, the researchers used the statistical program STATA 15.0 to analyse and test hypotheses.

6 Empirical study model

$$AUR_{it} = \alpha_i + \beta_1 VAIC_{it} + \varepsilon_{it} \quad (1)$$

$$ROA_{it} = \alpha_i + \beta_1 VAIC_{it} + \beta_2 AUR_{it} + \varepsilon_{it} \quad (2)$$

The first equation represents the impact of intellectual capital on CA, and the second one represents the effect of intellectual capital and CA on financial performance, whereas:

α_i constant term

CA_{it} CA (asset use ratio)

$VAIC_{it}$ intellectual capital

ROA_{it} financial performance (ROA)

ε_{it} random error.

7 Variables measurement

Return on total assets (ROA) is one of the profitability ratios that measure the effectiveness of a firm in generating profits by utilising its assets. ROA reflects the business profits and efficiency of the company in the utilisation of total assets (Chen et al., 2005). The formula for calculating ROA is:

$$Financial\ Performance(ROA) = \frac{Net\ Income}{Total\ Assets} \times 100\%$$

In this study, CA was used as a mediating variable between the intellectual capital and the financial performance. Several scholars used asset utilisation ratio (AUR) as a measurement of CA (Gani and Jermias, 2006; Hapsari, 2018). The formula for calculating CA (AUR) is:

$$Competitive\ Advantage(CA) = \frac{Total\ Revenue}{Total\ Assets} \times 100\%$$

The independent variable in this study used the VAIC™ method developed by Pulic (2000). The formula for calculating intellectual capital (VAIC™) is:

$$Intellectual\ Capital(VAIC^{TM}) = HCE + SCE + CEE$$

The calculation of VAIC™ involves five steps:

1 Value added (VA) = Operating profit + Staff cost + Depreciation + Amortisation.

2 Human capital efficiency (HCE) = Value added/Human capital
Human capital = total salaries and wages.

3 Structural capital efficiency (SCE) = Structural capital (SC)/Value added (VA).

4 Structural capital (SC) = Value added (VA) – Human capital (HC)
Capital employed efficiency (CEE) = Value added (VA)/Capital employed (CE)
Capital employed (CE) = Book value of the net assets of a company.

5 VAIC™ = Human capital efficiency (HCE) + Structural capital efficiency (SCE) + Capital employed efficiency (CEE).

8 Data analysis and results

Previous literature indicates that there are three main methods for estimating panel data, which are the pooled regression model, the fixed-effect model, and the random effect model (Wooldridge, 2012; Baltagi, 2005). The pooled regression model relies on the ordinary least squares (OLS) method to estimate the regression model, where the banks under study (individual) are not distinguished by neglecting the differences in the variance between them and grouping all the data together and not as a time series representing different analysis units (sections). The fixed effect model is concerned with the existence of the difference in variance or individuality between banks through the presence of a fixed value (intercept) for each bank. The term 'fixed effect' refers to the fact that although the constant may differ between banks, this constant does not vary over time (time-invariant), that is, it remains constant for each bank over time. Finally, a random effect model in which the value of the constant is a common average for all banks. That is, the constant value of this model represents the arithmetic mean of the constant values for all banks.

8.1 Data collection and processing

The population of the current study is composed of commercial banks listed on the Amman Stock Exchange, which totalled 13 banks till 2018. The data related to all these banks was obtained through the banks' annual financial reports published on the website of the Jordan Securities Commission. All the financial reports for the years from 2009 to 2018 were collected, and the relevant data was extracted, which was then statistically analysed. Since the data collected represents 13 banks over a ten-year period (2009–2018), a cross-sectional time series design (panel design) was used. The time period represents ten years ($t = 10$), while the number of commercial banks was 13 ($i = 1, \ldots, 13$), which represents the number of sections, then the number of observations that were analysed was 130.

Through these annual financial reports, data on human capital efficiency, structural capital efficiency, and capital employed efficiency were obtained to represent the

VAIC™. In addition, the AUR was obtained to represent CA and the ROA to represent financial performance. The data that represents these variables was explained in detail in the variable measurement section.

To test the relationship between the study variables, researchers performed several procedures, to be able to choose which of the three models (pooled regression, fixed effect, and random effect) would be best for analysing cross-sectional time-series data, and these procedures were as follows:

1 Means, standard deviations, maxima, and minima of values were used to analyse data trends.

2 The Breusch and Pagan Lagrange multiplier test was used to compare the use of the panel data model or the pooled regression model.

3 The Hausman test was conducted to compare the use of the fixed effects model and the random effects model.

4 The researchers also performed diagnostic tests (specification tests). This is to verify the validity of the model and adhere to the assumptions of the linear regression model in the cross-sectional time-series data, which are as follows:
   - The autocorrelation or serial correlation was performed to verify that there is no correlation between the value of the dependent variable in the time period (t) and the value of the dependent variable in the previous time periods.
   - The normal distribution of errors test was performed. This is to ensure that the estimation errors are distributed roughly normally.
   - A multicollinearity test was conducted to ensure that there is no strong linear relationship between two or more independent variables.
   - A heteroskedasticity test was performed; this is to ensure that the variance in the regression errors is homogeneous (constant).

Table 1 Trade-off between pooled and panel data

Model (1) $CA_{it} = \alpha_i + \beta_1 VAIC_{it} + \varepsilon_{it}$	*Breusch-Pagan test*	*F-test*	*Result*
Chi^2	191.21		Panel data
p-value	0.000**		
F		42.86	Panel data
p-value		0.000**	
Model (2) $ROA_{it} = \alpha_i + \beta_1 VAIC_{it} + \beta_2 CA_{it} + \varepsilon_{it}$	*Breusch-Pagan test*	*F-test*	*Result*
Chi^2	196.56		Panel data
p-value	0.000**		
F		16.02	Panel data
p-value		0.000**	

Note: **significant at 1% level.

To choose between a pooled and a random model, the Breusch and Pagan Lagrangian Multiplier (LM) test was performed (Breusch and Pagan, 1980). The F-test was also used

to choose between a pooled and a fixed model. The null hypothesis (H0) for this test indicates that the data represents pooled data, while the alternative hypothesis (H1) indicates that the data represents panel data. The results in Table 1 indicate that the significance value of the Chi-squared test, as well as of the F-test, was less than 5% (p-value = 0.000) for the two models, and this means that the data represents a random model, that is, the panel data.

As the data represents panel data, the Hausman test is used to choose between random and fixed effect models (Hausman, 1978). The null hypothesis (H0) of the Hausman test indicates a random model, while the alternative hypothesis (H1) indicates a fixed model.

Table 2 shows that the significant value for either the first (p-value = 0.9746) or the second (p-value = 0.9018) model was greater than 5%, indicating that the random effect model is the preferable model.

Table 2 Trade-off between fixed and random effect model

Study model	*Hausman test*	*Result*
Model (1): $CA_{it} = \alpha_i + \beta_1 VAIC_{it} + \varepsilon_{it}$		
Chi^2	0.000	Random model
p-value	0.9746	
Model (2): $ROA_{it} = \alpha_i + \beta_1 VAIC_{it} + \beta_2 CA_{it} + \varepsilon_{it}$		
Chi^2	0.210	Random model
p-value	0.9018	

8.2 Diagnostic tests

Several diagnostic tests were performed to ensure the validity of the assumptions underlying the regression analysis. The results in Table 3 indicate that the residuals are normally distributed except for CA (asset use ratio). To overcome this problem, the researchers transformed the data for this variable to standard values (z values) based on previous studies (Haniffa and Cooke, 2005).

Table 3 Test of regression residuals*

Variable	*Test*	*Test value*	*Sig.*
Intellectual capital (VAIC)	Shapiro-Wilk	0.99222	0.69095
	Shapiro-Francia	0.99170	0.55040
Return on assets (ROA)	Shapiro-Wilk	0.98141	0.07201
	Shapiro-Francia	0.98099	0.06179
Competitive advantage (CA)	Shapiro-Wilk	0.77272	0.00000
	Shapiro-Francia	0.76870	0.00001

Note: *The null hypothesis (H0) of this test indicates that the data are normally distributed.

To ensure that the heteroskedasticity problem was not present, the Breusch-Pagan/ Cook-Weisbrg test and the White test were used. The results in Table 4 indicate that the significance value for Chi-squared was 0.6222, which is greater than 5%, and this means

accepting the null hypothesis, meaning that there is no heteroskedasticity problem. This result is also confirmed by the (white) test.

Table 4 Heteroskedasticity test*

Test	*Chi²*	*Sig.*
Breusch-Pagan/Cook-Weisbrg	0.27	0.6022
White	3.2025	0.6688

Note: *The null hypothesis (H0) for this test indicates that there is no difference in the residual or regression variance.

To test for serial correlation (autocorrelation) problems, the researchers conducted the Wooldridge test. The results in Table 5 indicate that the significance value of the Wooldridge test was less than 5%, which means that there is a serial correlation problem. The researchers used robust standard errors for panel regressions to solve this problem (Baltagi, 2005).

Table 5 Serial correlation (autocorrelation) test

Index	*Value*
F-value	9.567
Sig.	0.0093

Note: *The null hypothesis (H0) for this test indicates that there is no serial correlation.

Table 6 Regression analysis results

Independent variables		*Model (1): CA*	*Model (2): ROA*
Intellectual capital (VAIC)	β	0.5146	0.0028
	Standard error	0.0757	0.0003
	z-value	6.80	10.47
	p-value	0.000**	0.000**
Competitive advantage (CA)	β	-	0.0018
	Standard error	-	0.0003
	z-value	-	6.61
	p-value	-	0.000**
Constant		–1.0198	–0.0026
Observations		130	130
R2		0.2372	0.6442
Chi squared (Wald)		46.24	305.79
P-value		0.000	0.000

Note: **significant at 1% level, * significant at 5% level.

8.3 Study model testing

Table 6 refers to the results of the regression analysis using robust standard deviation errors to overcome the problem of serial correlation and standard values of data to address the normal distribution problem. Regression analysis was performed using the

random effect model to test the first model (model 1), which contains the CA (AUR) as the dependent variable, and the second study model (model 2), which contains the ROA as the dependent variable.

8.3.1 Hypotheses of model (1)

This model contains one hypothesis (H1), which is the effect of intellectual capital (VAIC™) on CA. The results indicated that intellectual capital has a positive and significant impact on the CA ($\beta = 0.5146$; $Z = 6.80$; Sig = 0.000), meaning that the higher the level of intellectual capital, the greater the CA (i.e., the greater the AUR). The results also indicate that intellectual capital explains 24% of the variance in the CA (AUR), meaning that 24% of the changes that occur in the CA are due to the change in intellectual capital. Based on these results, the model of CA as a dependent variable is as follows:

$$CA_{it} = -1.0198 + 0.5146 \times VAIC_{it} + 0.0757$$

8.3.2 Hypotheses of model (2)

This model contains two hypotheses, namely the first hypothesis (H2), which represents the effect of intellectual capital on the ROA; and the second hypothesis (H3), which represents the effect of CA on the ROA. The results indicated that intellectual capital has a positive and significant impact on the ROA ($\beta = 0.0028$; $Z = 10.47$; Sig = 0.000), meaning that the higher the level of intellectual capital, the greater the ROA. The results also indicated that the CA has a positive and significant impact on the ROA ($\beta = 0.0018$; $Z = 6.61$; Sig = 0.000), meaning that the greater the CA (the asset use ratio), the greater the ROA. The results also indicate that the intellectual capital and the CA have explained 64% of the variance in ROA, meaning that 64% of the changes that occurred in the ROA were due to the change in the intellectual capital and the AUR. Based on these results, the model of ROA as a dependent variable is as follows:

$$ROA_{it} = -0.0026 + 0.0028 \times VAIC_{it} + 0.0018 \times CA_{it} + 0.0003$$

8.4 Testing mediation impact

To test the mediating impact of CA on the relationship between intellectual capital and ROA, the researchers used the structural equation model (SEM) using the STATA 15.0 program. Based on the Baron and Kenny (1986) method and the modified method developed by Iacobucci et al. (2007). The results of utilising the structural equations model to analyse the mediation variable are shown in Figure 2 and Table 7.

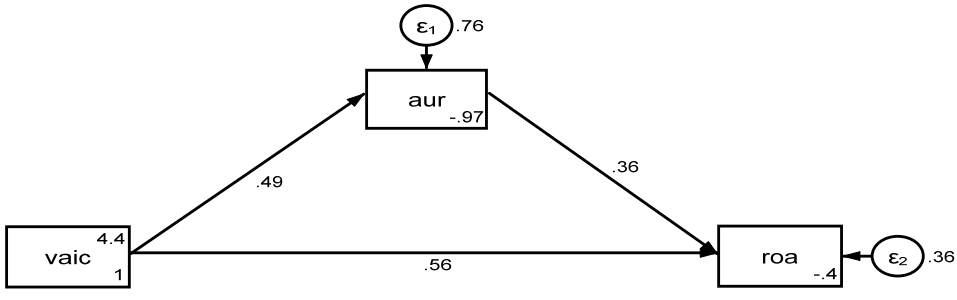
A Sobel test was performed to calculate the *z*-value for the mediating effect. Table 8 shows the results of the Sobel test.

The Baron and Kenny test was applied to our findings in Table 9 to determine the mediating effect of CA on the relationship between intellectual capital and ROA.

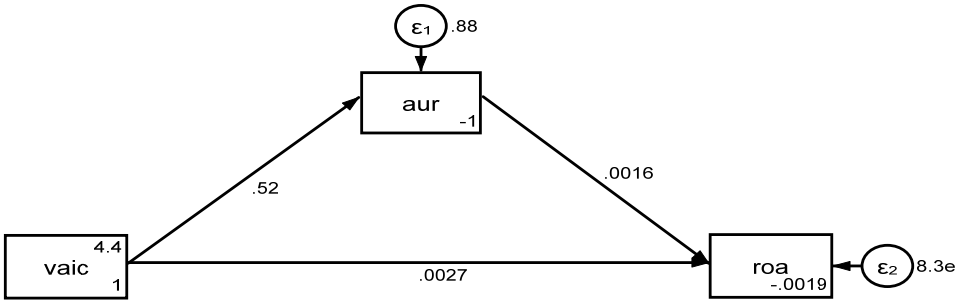
Since the effect of intellectual capital on CA is significant, and the effect of CA on ROA is significant as well, this means that there is a mediation impact. To identify the nature of this impact (full or partial mediation), the impact of intellectual capital on ROA was significant, and the value of (z) for the Sobel test was also significant. According to

Baron and Kenny (1986), this means that CA's mediation impact on the relationship between CA and ROA was partial.

Figure 2 Mediation variable analysis, (a) standardised values, (b) unstandardised values



(a)



(b)

Table 7 Direct, indirect, and total impact

Path	*Direct impact*			
	β	*Error*	*z*	*p-value*
Intellectual capital → Competitive advantage	0.487	0.0817	6.36	0.000**
Competitive advantage → Return on assets	0.358	0.0003	5.98	0.000**
Intellectual capital → Return on assets	0.565	0.0003	9.43	0.000**
Path	*Indirect impact*			
	β	*Error*	*z*	*p-value*
Intellectual capital → Return on assets	0.175	0.0002	4.36	0.000**
Path	*Total impact*			
	β	*Error*	*z*	*p-value*
Intellectual capital → Competitive advantage	0.487	0.0817	6.36	0.000**
Competitive advantage → Return on assets	0.358	0.0003	5.98	0.000**
Intellectual capital → Return on assets	0.739	0.0003	12.51	0.000**

Note: **Significant at 1% level.

Table 8 CA mediating impact test

Estimating	*Delta*	*Sobel*
Direct impact	0.175	0.175
Standard error	0.036	0.036
z-value	4.795	4.805
p-value	0.000	0.000
Indirect impact/total impact[1]		0.236
Indirect impact/direct impact[2]		0.309

Notes: [1]About 24% of the impact of intellectual capital on ROA is mediated by CA.
[2]The mediating impact is about 0.31 times the direct effect of intellectual capital on ROA.

Table 9 Baron and Kenny results

Step	*Path*		*β*	*p-value*
1	Intellectual capital → Competitive advantage	a	0.487	0.000**
2	Competitive advantage → Return on assets	b	0.358	0.000**
3	Intellectual capital → Return on assets	c	0.565	0.000**

Note: **significant at 1% level.

9 Discussion

Because of the traditional accounting model limitations that do not fully measure intellectual capital assets, this study seeks to contribute to the efforts made by researchers and practitioners to find an appropriate measure of intellectual capital by using the VAIC™ model. This study also sought to validate the VAIC™ model in evaluating the impact of intellectual capital on organisations' performance and competitiveness.

The results show that intellectual capital has a positive impact on CA in Jordanian commercial banks, which means that the greater the value of intellectual capital, the greater the bank's CA. This result supports the resource-based theory (Barney, 1996), which states that a CA will be created if the company is able to manage its resources efficiently and effectively. In other words, intellectual capital can provide added value to the company, which will increase its CA. This result is in line with the findings of several previous studies that show that intellectual capital improves a company's CA (Bontis, 2002; Chen et al., 2005; Hitt et al., 2001; Kamukama et al., 2011; Khan, 2018; Chen and Lin, 2004; Pratama and Achmad, 2015; Wu and Sivalogathasan, 2013).

The results also show that intellectual capital has a positive impact on the financial performance of commercial banks. The company's superior financial performance can be achieved if the company is able to manage its resources effectively and efficiently. The higher the intellectual capital, the higher the utilisation of company resources in generating profits. Intellectual capital can have a direct influence on the assets owned by a company if the company is able to manage its intellectual capital component properly. Thus, intellectual capital can contribute to the company's financial performance. Although some researchers (Weqar et al., 2021; Mondal and Ghosh, 2012; Morariu, 2014; Bharathi, 2008; Pal and Soriya, 2012) claim that intellectual capital has no effect

on some financial performance measures (e.g., return on equity and asset turnover ratio), the current study's findings are consistent with those of several other scholars who claim that intellectual capital has a positive and significant impact on a company's financial performance (Andreeva and Garanina, 2016; Dzenopoljac et al., 2016, 2017; Inkinen, 2015; Khalique et al., 2015; Kurfi et al., 2017; Kweh et al., 2019; Nadeem et al., 2018; Nimtrakoon, 2015; Ozkan et al., 2017; Pratama and Achmad, 2015; Soewarno and Tjahjadi, 2020; Ting et al., 2020; Triastuty and Riduwan, 2017).

Results indicated that the bank's CA has a significant impact on the bank's financial performance. The higher the bank's CA, the higher the profits will be, so that the bank's financial performance will also increase. Although some researchers have pointed out that CA has no effect on financial performance (i.e., Suripto, 2019), our result is consistent with several previous studies (i.e., Rochmadhona et al., 2018; Kamukama et al., 2011; Khan, 2018).

Despite the scarcity of research on the mediating role of CA in the relationship between intellectual capital and corporate financial performance, there is controversy regarding the mediating role of CA in this relationship. Some previous studies indicated that the CA mediates this relationship (Aslam et al., 2013; Ibarra-Cisneros et al., 2020; Kamukama et al., 2011; Mulyasari and Murwaningsari, 2019; Pratama and Achmad, 2015; Rochmadhona et al., 2018), while other studies indicated that the CA does not mediate this relationship (Lubis and Muchtar, 2019; Suripto, 2019; Nugroho, 2019).

Our results support the results of the studies that indicated that CA mediates the effect of intellectual capital on the financial performance of Jordanian commercial banks. These results indicate that each increase of one unit of CA will indirectly increase the influence of the intellectual capital variable on the bank's financial performance. Banks that choose a differentiation strategy and have high intellectual capital will be more able to compete and be better able to deal with environmental uncertainty because they are supported by adequate skills.

These contradictory results can be attributed to several reasons. First, the methodology used to measure intellectual capital (such as using the VAIC™ model) or the stage of economic development of the country in which the study was conducted (i.e., developed or developing countries). Second, most of the previous studies in the field of intellectual capital were limited to small samples (specific economic sectors) or data that covered short periods of time (Vishnu and Gupta, 2014; Gan and Saleh, 2008; Firer and Williams, 2003). Third, several researchers (Sveiby, 1997; Stewart, 2001) believe that the role of intellectual capital may be greater in influencing performance in the case of knowledge-intensive companies. Financial institutions, such as banks, are knowledge-intensive, skills-based, and relationship-rich industries (Jayasundara, 2008; Awwad and Al-Adaileh, 2012). Thus, the competitiveness of banking institutions will depend greatly on the quality of their intellectual capital and the extent to which the industry is able to benefit from or use the talents they possess. Fourth, previous studies ignored the role of mediating variables in the relationship between intellectual capital and firm performance. For example, several studies have linked intellectual capital to achieving CA (Garcia-Meca, 2005; Beattie and Thomson, 2007; Holland, 2006; Chen et al., 2005), and other studies have indicated the importance of CA in increasing the level of performance of companies (Chen et al., 2005). Thus, it can be said that a CA can play an important mediating role in the relationship between intellectual capital and performance. Finally, several previous studies relied on the survey (questionnaire) to

measure respondents' perception of intellectual capital and company performance. Therefore, the current study used financial measures provided in the financial reports of commercial banks listed on the Amman Stock Exchange to assess intellectual capital, financial performance, and CA.

10 Implications

Intellectual capital has a positive and significant impact on the financial performance (ROA) and CA (AUR) of the commercial banks listed on the Amman Stock Exchange. CA (AUR) has a positive impact on the financial performance (ROA) of commercial banks listed on the Amman Stock Exchange and mediates the impact of intellectual capital on financial performance.

These important results have many implications. Theoretically, the results show that there is a significant positive impact of the value-added intellectual coefficient (VAIC™) on the company's financial performance (ROA). This means that intellectual capital plays a major role in reducing the company's production costs and creating value for shareholders and other stakeholders. On the other hand, the methodology of intellectual capital (VAIC™) contributes to enabling firms to develop a CA that enables them to face the increasing competition, especially in the banking sector, where intellectual capital (especially human capital) plays an important role in defining the rules of competition considering the lack of differentiation between banks in the other elements that constitute the main tools of competition, such as price, service provided, and technology used. This requires banks to focus on developing employees' skills that form the basis for achieving banks' CA by empowering them and providing them with the necessary skills to deal with clients and build sustainable relationships. These results confirm that companies that have high intellectual capital have a CA that enables them to improve value and increase the level of financial performance of the company (Chen et al., 2005).

Practically, the findings invite managers and decision-makers in commercial banks to apply intellectual capital (VAIC™) methodology, manage it and make better use of it, and compare it with the best competitors in the sector. Accountants at these banks could also adopt this methodology as a possible disclosure measure for intellectual capital. Additionally, investors can use the VAIC™ methodology to assist them in selecting companies for their portfolios that have good practice in creating added value in an effective and sustainable manner. Finally, governments can use this methodology to evaluate different companies and different sectors of the economy in terms of the value-added generated by intellectual capital. This may lead to better economic policies and improvement of the knowledge economy management process. These results also encourage the Jordan Securities Commission to develop accounting standards and practices for companies to disclose details of their intellectual capital because of their importance as a standard for evaluating the performance of these companies.

11 Limitations and future research

The current study has its own limitations and future research directions. *First*, the current study relied on the VAIC™ methodology to measure the intellectual capital in commercial banks, while there are several methodologies used to measure intellectual

capital (Firer and Williams, 2003), such as market value, ROA, and balanced scorecard methods. Thus, future research can use different methods to measure the efficiency of intellectual capital and its impact on the financial performance of companies. *Second*, it was difficult to distinguish between the dimensions of intellectual capital through the financial statements of banks. Because of the lack of sufficient information in some financial reports, intellectual capital has been measured as one construct, even though it consists of three dimensions, namely human capital, structural capital, and relational capital. Future research may attempt to measure the dimensions of intellectual capital and determine the impact of each dimension on the CA and financial performance of Jordanian banks. *Third*, the current study was conducted in Jordan's commercial banking sector; therefore, future studies can consider Islamic banks, or other service sectors, and compare the results. The study can also be applied to non-service sectors (industrial sectors) to find out the efficiency of intellectual capital in these sectors. *Fourth*, CA was introduced in the study model as a mediating variable between intellectual capital and the financial performance of banks. Future studies can test other mediating variables to explain the contradiction in the results of previous studies. *Fifth*, ROA is used to measure the financial performance of banks, which is an accounting measure. Future studies can use other market-based financial indicators to measure financial performance.

References

An, H.J. and Kim, W.K. (2019) 'A case study on the influence factors of financial performance of Korean automotive parts cooperation companies through research hypothesis', *The Journal of Asian Finance, Economics and Business*, Vol. 6, No. 3, pp.327–337.

Ana, S.R., Sulistiyo, A.B. and Prasetyo, W. (2021) 'The effect of intellectual capital and good corporate governance on company value mediated by competitive advantage', *Journal of Accounting and Investment*, Vol. 22, No. 2, pp.276–295.

Andreeva, T. and Garanina, T. (2016) 'Do all elements of intellectual capital matter for organizational performance? Evidence from Russian context', *Journal of Intellectual Capital*, Vol. 17, No. 2, pp.397–412.

Anielak-Sobczak, K. (2022) 'A bank's intellectual capital and its importance in building competitiveness on the example of Polish listed banks', *Ekonomia i Prawo. Economics and Law*, Vol. 21, No. 1, pp.5–24 (Forthcoming).

Anuonye, N.B. (2015) 'Intellectual capital measurement: using the earnings per share model of quoted insurance companies in Nigeria', *International Business and Management*, Vol. 10, No. 1, pp.88–98.

Aslam, M.S., Ayub, A. and Razzaq, A. (2013) 'Technological learning: moderator between intellectual capital and organizational performance', *Interdisciplinary Journal of Contemporary Research in Business*, Vol. 4, No. 11, pp.436–451.

Awwad, M.S. and Al-Adaileh, R.M. (2012) 'Factors determining customer relationship management practices: the context of Jordanian commercial banks', *Jordan Journal of Business Administration*, Vol. 8, No. 1, pp.208–220.

Baltagi, B.H. (2005) *Econometric Analysis of Panel Data*, 3rd ed., John Wiley & Sons Ltd., The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ, England.

Barney, J.B. (1996) 'The resource-based theory of the firm', *Organization Science*, Vol. 7, No. 5, pp.469–469.

Baron, R.M. and Kenny, D.A. (1986) 'The moderator-mediator variable distinction in social psychological research: conceptual, strategic and statistical considerations', *Journal of Personality and Social Psychology*, Vol. 51, No. 6, p.1173.

Beattie, V. and Thomson, S.J. (2007) 'Lifting the lid on the use of content analysis to investigate intellectual capital disclosures', *Accounting Forum*, Vol. 31, No. 2, pp.129–163.

Bharathi, K.G. (2008) 'Intellectual capital and corporate performance in Indian pharmaceutical industry', *Journal of Intellectual Capital*, Vol. 9, No. 4, pp.684–704.

Bontis, N. (2002) *National Intellectual Capital Index: Intellectual Capital Development in the Arab Region*, United Nations Office for Project Services, New York.

Bontis, N., Chua Chong, K.W. and Richardson, S. (2000) 'Intellectual capital and business performance in Malaysian industries', *Journal of Intellectual Capital*, Vol. 1, No. 1, pp.85–100.

Breusch, T.S. and Pagan, A.R. (1980) 'The Lagrange multiplier test and its applications to model specification in econometrics', *The Review of Economic Studies*, Vol. 47, No. 1, pp.239–253, https://doi.org/10.2307/2297111.

Cao, D., Berkeley, N. and Finlay, D. (2014) 'Measuring sustained competitive advantage from resource-based view: survey of Chinese clothing industry', *Journal of Sustainable Development*, Vol. 7, No. 2, pp.89–104.

Chan, K. (2009) 'Impact of intellectual capital on organizational performance: an empirical study of companies in the Hang Seng index', *The Learning Organization*, Vol. 16, No. 1, pp.22–39.

Chen, H.M. and Lin, K.J. (2004) 'The role of human capital cost in accounting', *Journal of Intellectual Capital*, Vol. 5, No. 1, pp.116–130.

Chen, M., Cheng, S. and Hwang, Y. (2005) 'An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance', *Journal of Intellectual Capital*, Vol. 6, No. 2, pp.159–176.

Cheng, M., Lin, J., Hsiao, T. and Lin, T.W. (2010) 'Invested resource, competitive intellectual capital and corporate performance', *Journal of Intellectual Capital*, Vol. 11, No. 4, pp.433–450.

Choudhury, J. (2010) 'Performance impact of intellectual capital: a study of Indian IT sector', *International Journal of Business and Management*, Vol. 5, No. 9, pp.72–80.

Chu, S., Chan, K., Yu, K., Ng, H. and Wong, W. (2011) 'An empirical study of the impact of intellectual capital on business performance', *Journal of Information and Knowledge Management*, Vol. 10, No. 1, pp.11–21.

Clarke, M., Seng, D. and Whiting, R.H. (2011) 'Intellectual capital and firm performance in Australia', *Journal of Intellectual Capital*, Vol. 12, No. 4, pp.505–530.

Dean, A. and Kretschmer, M. (2007) 'Can ideas be capital? Factors of production in the postindustrial economy: a review and critique', *Academy of Management Review*, Vol. 32, No. 2, pp.573–594.

Dumay, J. (2016) 'A critical reflection on the future of intellectual capital: from reporting to disclosure', *Journal of Intellectual Capital*, Vol. 17, No. 1, pp.168–184.

Dzenopoljac, V., Janosevic, S. and Bontis, N. (2016) 'Intellectual capital and financial performance in the Serbian ICT industry', *Journal of Intellectual Capital*, Vol. 17, No. 2, pp.373–396.

Dzenopoljac, V., Yaacoub, C., Elkanj, N. and Bontis, N. (2017) 'Impact of intellectual capital on corporate performance: evidence from the Arab region', *Journal of Human Resource Costing and Accounting*, Vol. 18, No. 4, pp.884–903.

Eisenhardt, K.M. and Schoonhoven, C.B. (1996) 'Resource-based view of strategic alliance formation: strategic and social effects of entrepreneurial firms', *Organizational Science*, Vol. 7, No. 2, pp.136–150.

Firer, S. and William S.M. (2003) 'Intellectual capital and traditional measures of corporate performance', *Journal of Intellectual Capital*, Vol. 4, No. 3, pp.348–360.

Galbraith, J.K. (1969) 'The consequences of technology', *Journal of Accountancy*, Vol. 127, No. 6, pp.44–56.

Gan, K. and Saleh, Z. (2008) 'Intellectual capital and corporate performance of technology-intensive companies: Malaysia evidence', *Asian Journal of Business and Accounting*, Vol. 1, No. 1, pp.113–130.

Gani, L. and Jermias, J. (2006) 'Investigating the effect of board independence on performance across different strategies', *The International Journal of Accounting*, Vol. 41, No. 3, pp.295–314.

Garcia-Meca, E. (2005) 'Bridging the gap between disclosure and use of intellectual capital information', *Journal of Intellectual Capital*, Vol. 6, No. 3, pp.427–440.

Handayani, S. and Karnawati, Y. (2019) 'Achieving competitive advantage through intellectual capital', *Annual International Conference on Accounting Research (AICAR 2019) Advances in Economics, Business and Management Research*, Vol. 127, Atlantes Press.

Haniffa, R.M. and Cooke, T.E. (2005) 'The impact of culture and governance on corporate social reporting', *Journal of Accounting and Public Policy*, Vol. 24, No. 5, pp.391–430.

Hapsari, I. (2018) 'The effect of competitive advantage toward financial performance with good information technology governance as moderating variable (an empirical studies on commercial banking listed in Indonesia Stock Exchange', *Kompartemen: jrnal ilmiah akuntansi*, Vol. XVII, No. 2, pp.1–9.

Hausman, J.A. (1978) 'Specification tests in econometrics', *Econometrica*, Vol. 46, No. 185, pp.1251–1272.

Hitt, M.A., Bierman, L., Shimizu, K. and Kochhar, R. (2001) 'Direct and moderating effects of human capital on strategy and performance in professional service firms: a resource-based perspective', *Academy of Management Journal*, Vol. 44, No. 1, pp.13–28.

Ho, C-A. and Williams, S.M. (2003) 'International comparative analysis of the association between board structure and the efficiency of value added by firm from its physical capital and intellectual capital resources', *The International Journal of Accounting*, Vol. 38, No. 4, pp.465–491.

Holland, J. (2006) 'Fund management, intellectual capital, intangibles and private disclosure', *Managerial Finance*, Vol. 32, No. 4, pp.277–316.

Hsu, Y.H. and Fang, W.C. (2009) 'Intellectual capital and new product development performance: the mediating role of organizational learning capability', *Technological Forecasting and Social Change*, Vol. 76, No. 1, pp.664–677.

Iacobucci, D., Saldanha, N. and Deng, X. (2007) 'A meditation on mediation: evidence that structural equations models perform better than regressions', *Journal of Consumer Psychology*, Vol. 17, No. 2, pp.139–153.

Ibarra-Cisneros, M.A., Hernández-Perlines, F. and Rodríguez-García, M. (2020) 'Intellectual capital, organisational performance and competitive advantage', *European J. of International Management (EJIM)*, Vol. 14, No. 6, pp.287–311.

Igielski, M. (2018) 'The role of intellectual capital in building a competitive advantage for companies from the Baltic Sea Region in the transport, shipping and logistic industry (TSL)', in *SHS Web of Conferences*, Vol. 57, p.01015, EDP Sciences.

Inkinen, H. (2015) 'Review of empirical research on intellectual capital and firm performance', *Journal of Intellectual Capital*, Vol. 16, No. 3, pp.518–565.

Isada, F. and Isada, Y. (2019) 'An empirical study of strategic corporate governance and competitive advantage', *Journal of Economics, Business and Management*, Vol. 7, No. 1, pp.10–16.

Jayasundara, C. (2008) 'Knowledge management in banking industries: uses and opportunities', *Journal of The University Librarians Association of Sri Lanka*, Vol. 12, pp.68–84, DOI: 10.4038/jula.v12i0.329.

Kamukama, N., Ahiauzu, A. and Ntayi, J.M. (2011) 'Competitive advantage: mediator of intellectual capital and performance', *Journal of Intellectual Capital*, Vol. 12, No. 1, pp.152–164.

Kanchana, N. and Mohan, R.R. (2017) 'A review of empirical studies in intellectual capital and firm performance', *Indian Journal of Commerce and Management Studies*, Vol. 8, No. 1, p.52.

Khalique, M., Bontis, N., Bin Shaari, J.A.N. and Isa, A.H.M. (2015) 'Intellectual capital in small and medium enterprises in Pakistan', *Journal of Intellectual Capital*, Vol. 16, pp.224–238.

Khalique, M., Hina, K., Ramayah, T. and Bin Shaari, J.A.N. (2020) 'Intellectual capital in tourism SMEs in Azad Jammu and Kashmir, Pakistan', *Journal of Intellectual Capital*, Vol. 21, No. 3, pp.333–355.

Khan, A. (2018) 'An empirical study of the impact of intellectual capital on the financial performance of Indian IT sector', *Journal of Corporate Finance Research*, Vol. 15, No. 1, pp.7–19.

Khani, A., Hosain, A., Ahmadi, F. and Homayouni, G. (2011) 'The impact of intellectual capital on performance of Iranian food firms', *Interdisciplinary Journal of Contemporary Research in Business*, Vol. 2, No. 10, pp.315–326.

Klimontowicz, M. (2019) 'The role of banks' innovativeness in building sustainable market efficiency: the case of Poland', *Entrepreneurship and Sustainability Issues*, Vol. 7, No. 1, pp.525–538.

Kurfi, S.A., Noraza, M.U. and Saleh, M.B. (2017) 'The impact of intellectual capital on the financial performance of listed Nigerian food products companies', *Journal of Accounting and Taxation*, Vol. 9, No. 11, pp.147–160.

Kweh, Q.L., Ting, I.W.K., Hanh, L.T.M. and Zhang, C. (2019) 'Intellectual capital, governmental presence and firm performance of publicly listed companies in Malaysia', *International Journal of Learning and Intellectual Capital*, Vol. 16, No. 2, pp.193–211.

Lev, B. (2001) *Intangibles: Management, Measurement and Reporting*, Brookings Institution Press, Washington, DC.

Li, Z., Chen, Z., Lui, T. and Chu, S. (2016) 'The impact of intellectual capital on companies performances: a study based on MAKE award winners and non-MAKE award winner companies', *International Conference on Knowledge Management*, ICKM.

Lin, Y., Lee, C., Chao, C. and Liu, C. (2015) 'The information content of unexpected stock returns: evidence from intellectual capital', *International Review of Economics and Finance*, Vol. 37, No. C, pp.208–225.

Lubis, I. and Muchtar, Y. (2019) 'Analyzing business performance of small and medium enterprises (SMEs) based on human capital, social capital and competitive advantage', *Ecoforum Journal*, Vol. 8, No. 2, pp.1–8.

Mehri, M., Umar, M.S., Saeidi, P., Hekmat, R.K. and Naslmosavi, S. (2013) 'Intellectual capital and firm performance of high intangible intensive industries: Malaysia evidence', *Asian Social Science*, Vol. 9, No. 9, p.146.

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

Montequín, V.R., Fernández, F.O., Cabal, V.A. and Gutierrez, N.R. (2006) 'An integrated framework for intellectual capital measurement and knowledge management implementation in small and medium-sized enterprises', *Journal of Information Science*, Vol. 32, No. 6, pp.525–538.

Morariu, M.C. (2014) 'Intellectual capital performance in the case of Romanian public companies', *Journal of Intellectual Capital*, Vol. 15, No. 3, pp.392–410.

Mulyasari, W. and Murwaningsari, E. (2019) 'Intellectual capital, competitive advantage, financial performance and company value among banking industries in Indonesia', *Advances in Social Sciences Research Journal*, Vol. 6, No. 4, pp.78–89.

Nadeem, M., Gan, C. and Nguyen, C. (2018) 'The importance of intellectual capital for firm performance: evidence from Australia', *Australian Accounting Review*, Vol. 28, No. 3, pp.334–344.

Nguyen, H., Tran, T.H.M., Nguyen, T.H.Y. and Truong, D.D. (2021) 'The influence of competitive advantage on financial performance: a case study of SMEs in Vietnam', *The Journal of Asian Finance, Economics and Business*, Vol. 8, No. 5, pp.335–343.

Nguyen, M.T. and Khoa, B.T. (2020) 'Improving the competitiveness of exporting enterprises: a case of Kien Giang province in Vietnam', *Journal of Asian Finance, Economics and Business*, Vol. 7, No. 6, pp.495–508.

Nimtrakoon, S. (2015) 'The relationship between intellectual capital, firms' market value and financial performance: empirical evidence from the ASEAN', *Journal of Intellectual Capital*, Vol. 16, No. 3, pp.587–618.

Nugroho, V. (2019) 'Intellectual capital determinant and company's values', *Innovative Journal of Business and Management*, Vol. 8, No. 7, pp.135–152.

Olarewaju, O.M. and Msomi, T.S. (2021) 'Intellectual capital and financial performance of South African development community's general insurance companies', *Heliyon*, Vol. 7, No. 4, p.e06712.

Ozkan, N., Cakan, S. and Kayacan, M. (2017) 'Intellectual capital and financial performance: a study of the Turkish banking', *Borsa Istanbul Review*, Vol. 17, No. 3, pp.190–198.

Pal, K. and Soriya, S. (2012) 'IC performance of Indian pharmaceutical and textile industry', *Journal of Intellectual Capital*, Vol. 13, No. 1, pp.120–137.

Porter, M.E. (1985) *Competitive Advantage – Creating and Sustaining Superior Performance*, The Free Press, New York, NY.

Potjanajaruwit, P. (2018) 'Competitive advantage effects on firm performance: a case study of startups in Thailand', *Journal of International Studies*, Vol. 11, No. 3, pp.104–111.

Pratama, Y.H. and Achmad, T. (2015) 'The effect of intellectual capital on company performance with competitive advantage as an intervening variable', *Diponegoro Journal of Accounting*, Vol. 4, No. 2, pp.1–11.

Pulic, A. (2000) 'VAIC – an accounting tool for IC management', *International Journal of Technology Management*, Vol. 20, Nos. 5–8, pp.702–714.

Rochdi, D., Khatijah, O. and Muhammad, A.S.A.H. (2017) 'Mediating role of the innovation effectiveness on the relationship between entrepreneurial', *Polish Journal of Management Studies*, Vol. 15, No. 1, pp.185–196.

Rochmadhona, B.N., Suganda, T.R. and Cahyadi, S. (2018) 'The competitive advantage between intellectual capital and financial performance of the banking sector in ASEAN', *Jurnal Keuangan dan Perbankan*, Vol. 22, No. 2, pp.321–334.

Roos, G., Bainbridge, A. and Jacobsen, K. (2001) 'Intellectual capital analysis as a strategic tool', *Strategy and Leadership*, Vol. 29, No. 4, pp.21–26.

Sar, A.K. (2017) 'Competitive advantage and performance: an analysis of Indian downstream oil and gas industry', *Academy of Accounting and Financial Studies Journal*, Vol. 21, No. 2, pp.1–7.

Sardo, F. and Serrasqueiro, Z. (2018) 'Intellectual capital, growth opportunities and financial performance in European firms: dynamic panel data analysis', *Journal of Intellectual Capital*, Vol. 19, No. 4, pp.747–767.

Secundo, G., Elena, S., Martinaitis, Z. and Leitner. K. (2015) 'An intellectual capital maturity model (ICMM) to improve strategic management in European universities: a dynamic approach', *Journal of Intellectual Capital*, Vol. 16, No. 2, pp.419–442.

Shiu, H.J. (2006) 'The application of the value-added intellectual coefficient to measure corporate performance: evidence from technological firms', *International Journal of Management*, Vol. 23, No. 2, pp.356–365.

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, https://doi.org/10.1108/jic-09-2019-0225.

Stewart, T.A. (2001) *The Wealth of Knowledge: Intellectual Capital and the Twenty-first Century Organization*, Doubleday/Currency, New York.

Stiles, P. and Kulvisaechana, S. (2004) *Human Capital and Performance in Public Sector*, Judge Institute of Management, University of Cambridge, Cambridge.

Suripto, J.G. (2019) 'Intellectual capital determinant towards company's competitive advantage and performance and its impact on company's values', *International Journal of Business, Economics and Law*, Vol. 19, No. 5, pp.145–163.

Sveiby, K. (1997) *The New Organizational Wealth: Managing and Measuring Knowledge – Based Assets*, Berett-Koehler, San Francisco, USA.

Tan, H., Plowman, D. and Hancock, P. (2008) 'The evolving research on intellectual capital', *Journal of Intellectual Capital*, Vol. 9, No. 4, pp.585–608.

Ting, I.W.K., Ren, C., Chen, F-C. and Kweh, Q.L. (2020) 'Interpreting the dynamic performance effect of intellectual capital through a value-added-based perspective', *Journal of Intellectual Capital*, Vol. 21, No. 3, pp.381–401.

Tovstiga, G. and Tulugurova, E. (2009) 'Intellectual capital practices: a four-region comparative study', *Journal of Intellectual Capital*, Vol. 10, No. 1, pp.70–80.

Triastuty, S. and Riduwan, A. (2017) 'The effect of intellectual capital and the mechanism of corporate governance on financial performance', *Journal Accounting Science and Research*, Vol. 6, No. 2, pp.703–322.

Vidyarthi, H. (2019) 'Dynamics of intellectual capitals and bank efficiency in India', *Service Industries Journal*, Vol. 39, No. 1, pp.1–24.

Vishnu, S. and Gupta, K. (2014) 'Intellectual capital and performance of pharmaceutical firms in India', *Journal of Intellectual Capital*, Vol. 15, pp.83–99.

Wah, S., Hang, K. and Wu, W. (2011) 'Charting intellectual capital performance of the gateway to China', *Journal of Intellectual Capital*, Vol. 12, No. 2, pp.249–276.

Wang, W. and Chang, C. (2005) 'Intellectual capital and performance in causal models: evidence from the information technology industry in Taiwan', *Journal of Intellectual Capital*, Vol. 6, No. 2, pp.222–236.

Weqar, F. and Haque, S.I. (2020) 'Intellectual capital and corporate financial performance in India's central public sector enterprises', *International Journal of Learning and Intellectual Capital*, Vol. 17, No. 1, pp.77–97.

Weqar, F., Khan, A.M., Raushan, M. and Haque, S.M. (2021) 'Measuring the impact of intellectual capital on the financial performance of the finance sector of India', *Journal of the Knowledge Economy*, Vol. 12, No. 3, pp.1134–1151.

Widyaningdyah, A.U. and Aryani, Y.A. (2013) 'Intellectual capital and competitive advantage (empirical study on manufacturing companies Jakarta stock industrial classification – JASICA)', *Jurnal Akuntansi dan Keuangan*, Vol. 15, No. 1, pp.1–14.

Wijayanto, A., Dzulkirom, M. and Nuzula, N.F. (2019) 'The effect of competitive advantage on financial performance and firm value: evidence from Indonesian manufacturing companies', *Russian Journal of Agricultural and Socio-Economic Sciences*, Vol. 85, No. 1, pp.35–44.

Wooldridge, J.M. (2012) *Introductory Econometrics: A Modern Approach (Upper-Level Economics Titles)*, Vol. 41, pp.673–690, Southwestern College Publishing, Nashville, TN.

Wu, X. and Sivalogathasan, V. (2013) 'Mediated moderation effect on innovation capability: intellectual capital and innovation capability of the apparel industry in Sri Lanka', *Journal of International Society for Professional Innovation Management*, Vol. 26, No. 3, pp.13–21.

Xu, J. and Li, J.S. (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*, Vol. 20, No. 4, pp.488–509, https://doi.org/10.1108/JIC-04-2018-0074.

Xu, J. and Wang, B. (2018) 'Intellectual capital, financial performance and companies' sustainable growth: evidence from the Korean manufacturing industry', *Sustainability*, Vol. 10, No. 12, pp.46–51.

Xu, X.L., Chen, H.H. and Zhang, R.R. (2020) 'The impact of intellectual capital efficiency on corporate sustainable growth – evidence from smart agriculture in China', *Agriculture*, Vol. 10, No. 6, p.199.

Yaseen, S.G., Dajani, D. and Hasan, Y. (2016) 'The impact of intellectual capital on the competitive advantage: applied study in Jordanian telecommunication companies', *Computers in Human Behavior*, Vol. 100, No. 62, pp.168–175.

Zakery, A. and Saremi, M.S. (2021) 'Knowledge and intellectual capital in internationalizing SMEs, case study in technology-based health companies', *Journal of Intellectual Capital*, |Vol. 22, No. 2, pp.219–242.