The contribution of intellectual capital to banks' competitive and financial performance: The evidence from Poland

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Abstract

PURPOSE: *The paper aims to investigate the contribution of intellectual capital to banks' competitive and financial performance.* ***METHODOLOGY:*** *The paper uses data retrieved from a research survey. The questionnaire on IC contribution to banks' competitive performance was applied to executive managers of retail banks operating in the Polish banking market. The data collected for the assessment of financial performance were retrieved from banks' annual reports and referred to each year from 2012 to 2019. The data were analyzed by Principal Axis Factor Analysis (PAF) and Partial Least Squares Structural Equation Modelling (PLS-SEM).* ***FINDINGS:*** *The results revealed that banks' competitive and financial performance depends on both the intellectual capital and environmental factors. The relation between financial performance and intellectual capital is positively mediated by competitive performance, and environmental factors can affect the strength of this relationship. The findings show that applying the resource-based theory might not be sufficient to gain a competitive advantage and sustainable market position in the case of banks.* ***IMPLICATIONS:*** *The results develop IC knowledge and prove the necessity to conduct systematic research on their importance for creating value for customers and gaining competitive advantage. They also provide direction for banks' decision-makers concerning factors that should be taken into account to create competitive advantage, market performance, and efficiency. The Polish banking market has transformed from undeveloped and non-competitive into a developed and competitive one during the last few decades. Thus, the results also have implications for other companies operating in transition markets as their competitiveness depends on understanding which factors should be the foundation for their market strategy*

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*and their competitiveness and efficiency to become a developed one. **ORIGINALITY AND VALUE:** The majority of the IC research concentrate on developed countries, and very little is known about developing and transition countries that were successful on their journey. Most of the research has focused on identifying and measuring IC components and the relationship between them. Usually, the research presents the state of the art and it is based on financial reports. However, the extent to which IC impacts competitive and financial performance in banking markets has been relatively rare. To the authors' best knowledge, this is the first study to examine empirically the relationship between intellectual capital, environment, competitive performance, and efficiency in a transformed banking market in Europe, which analyses the IC contribution over a few years' perspectives.*
Keywords: *intellectual capital; competitive performance; financial performance; IC survey; principal axis factor analysis; partial least squares structural equation modeling*

INTRODUCTION

Both academics and practitioners have already accepted the general significance of knowledge for further sustainable growth and wealth creation across all industries (OECD, 1996; Kehelwalatenna & Premaratne, 2014; Neves & Proença, 2021). The development of knowledge importance has increased the interest in managing a firm's intellectual capital (do Rosario Cabrita & Vaz, 2006). The intellectual capital (IC) is defined as a crucial factor for sustainable competitive advantage (Steward, 1997; Edvinsson & Malone, 1997; Birchall & Tovstiga, 1999; Davenport & Pruzac, 2000; Mondal & Ghosh, 2012) and value creation (Edvinsson, 1997; Lev, 2001; Shaikh, 2004; Mavridis, 2005; Phusavat & Kanchana, 2007; Walsh, Enz & Canina, 2008; Schiavone, Meles, Verdoliva & Del Giudice, 2014; Chowdhury, Rana & Azim, 2019; *Rehman, Aslam & Iqbal, 2022*). In many instances, it appears to be significant for decision-making within the firm and external stakeholders and has implications for efficiency and productivity (Alhassan & Asare, 2016; Saymeh, Arikat, Hashem & Al-Khalieh, 2021). The banking sector, in general, offers an ideal area for IC research because the business nature of the banking sector is intellectually intensive (Mavridis, 2005; Branco, Delgado, Sousa & Sá, 2011; Ahuja & Ahuja, 2012; Neves & Proença, 2021).

During the last few decades, the banking sector has changed remarkably. Systematically increasing complexity of new technology, development of information and communication techniques, economy's networking, globalization, and growth of customers' expectations combined with regulatory requirements make banks face new challenges. New categories of risk have been revealed. The global financial crisis has reminded policymakers and customers that banks are the critical players in modern economies. The

crisis showed that banks and the banking system are too important to be left to self-regulate. As a result, new regulatory requirements were implemented to ensure banks' safety and sustainability. They concern equity capital requirements, liquidity requirements, and prudential standards (Basel III - Capital Requirements Directive CRDIV, Capital Requirements Regulation CRR). Another regulation that is thought to change market condition significantly is the Payment Service Directive (PSD2), opening the market for non-bank payment service providers. Additionally, a new generation of customers has entered the market. Compared with previous generations, the digital ones behave differently in the market. It will require adjusting banks' market strategies and business models (First Data Corporation, 2010; Williams & Page, 2011; BMO Wealth Institute, 2014). Considering the disruptively changing business environment and all other external aspects influencing banks' market activity, searching factors and analyzing the IC role in enabling banks to cope with them and concurrently gain the sustainable competitive advantage, market performance, and efficiency remain relevant. Although some empirical studies have found evidence to support the role of IC in helping to create a competitive advantage in the banking industry (Mondal & Ghosh, 2012) and its relationship with financial performance (Yaseen & Al-Amarneh, 2021; Neves & Proença, 2021), to the best of our knowledge, there are only a few that measure IC using a survey (Cabrita & Bontis, 2008; Curado, 2008; Mention & Bontis, 2013). Thus, providing the empirical evidence on the contribution of IC to the dynamics of the banks' value creation process remains rare, exclusively within specific geographic regions and industries (Alhassan & Asare, 2016; Mention & Bontis, 2013; Yaseen & Al-Amarneh, 2021).

Given this background, the paper seeks to expand the literature on IC and performance from the perspective of European transition markets. Specifically, the paper investigates the contribution of IC to banks' competitive and financial performance in Poland as an example of a country that successfully transformed from a developing country into a developed one. Achieving the purpose of the paper requires answering the following research questions (RQ):

> RQ1) *How strongly does the intellectual capital impact banks' competitive and financial performance?*
> RQ2) *To what extent may competitive performance impact the IC influence on banks' financial performance?*
> RQ3) *Do environmental factors impact the IC influence on banks' competitive and financial performance?*
> RQ4) *Does the size of a bank and the length of its market activity influence the assessment of IC's influence on the financial performance?*

Based on the research questions, the corresponding hypotheses were proposed. They were falsified using the Principal Axis Factor Analysis and Partial Least Squares Structural Equation Modelling. All calculations were done in R Project for Statistical Computing.

The remainder of this paper is structured as follows: the second section presents the literature review concerning IC as a foundation for banks' competitive performance and formulates the hypothesis and conceptual model, the third section considers the research methodology and describes the data, the sample, the measurement of model variables and research methods, and the fourth section presents the empirical results and discussion. The paper concludes with summary evidence of the study and its limitations.

LITERATURE REVIEW AND HYPOTHESIS

Competitive performance shows a firm's ability to convert its resources into strengths (Porter, 1990; Zineldin, 1996). According to the resource-based theory, the firm's assets are the foundation for building competitiveness, market and financial performance (Hamel & Prahalad, 1990; Barney, 1991; Acur & Bititci, 2004; Cheng, Lin, Hsiao & Lin, 2010; Zubac, Hubbard & Johnson, 2010). IC and its importance as a strategic resource and a competitive factor have been widely discussed over the last few decades. Several authors defined the term (e.g., Edvinsson & Malone, 1997; Edvinsson, 1997; Lev, 2001; Phusavat & Kanchana, 2007; Neves & Proença, 2021), but no consensus emerged. The authors agree with its complex character, intangible nature, and incredible potential for creating value and building a competitive advantage for any company (Klein & Prusak, 1994; Edvinsson, 1997; Lev, 2001; Shaikh, 2004; Mavridis, 2005; Phusavat & Kanchana, 2007; Walsh, Enz & Canina, 2008; Mondal & Ghosh, 2012). Unquestionably, IC is a link between knowledge, talent, skills, creativity, innovativeness, and other resources supporting the company's effectiveness and performance. Most of the existing studies are focused on developed countries, and, therefore, there is still little knowledge about the impact of IC in developing and emerging economies (Petty & Guthrie, 2000). They are mostly conducted in Africa and Asia in the banking industry, while a few transition economies are worth exploring in the European Union. To bridge this gap, the authors decided to choose Poland as one of the forerunners among new EU members. In the banking market, the researchers usually apply selected definitions and focus on factors that influence the IC perception and IC performance or, conversely, the influence of IC or its components on different aspects of firms' performance. In this

paper, bank's intellectual capital is defined as a strategic intangible asset that enables building a long-term sustainable competitive advantage.

There is a variety of IC typologies proposed and followed by authors. The term is extended to a complex list of components or narrowed down to just a few ones. Some scholars divide IC into human capital and structural capital (Petty & Guthrie, 2000; Joia, 2000). Another approach presents IC as three components, such as people, internal structure and external structure, corresponding to human capital (human resources, human assets), structural (organizational, infrastructure) capital, and relational (customer, client) capital (Roos & Roos, 1997; Bontis, 1998; Dzinkowski, 2000; Roos, Bainbridge & Jacobsen, 2001; McElroy, 2002). Many researchers split IC into different factors and items, further associated with variables to measure market efficiency and performance (Joshi, Cahill & Sidhu, 2010; Shih, Chang & Lin, 2010). Despite the authors' research, there were just a few attempts to examine some aspects of IC in Poland. Two of them focused on human resources. The first study concerned human management as a critical indicator of business activity (Haffer & Kristensen, 2010). The second one presented the integration of human resources responding to mergers of western corporations in Poland (Łupina-Wegener, 2013). Only one referred to the banking market and aimed to present a method enabling the assessment of the competitiveness of listed banks in Poland, taking economic and intellectual capital (Anielak-Sobczak, 2022).

Curado (2008), states that IC is identified as a different concept in the banking industry. This paper illustrates three different IC components of the banking industry: human capital, internal structures, and external structures. Some authors add a fourth component connected with the influence of technology on the financial service industry (Shih, 2008). On the contrary, others use a synthetic measure to examine the IC efficiency, such as as HCE, SCE and RCE (Poh, Kilicman & Ibrahim, 2018; *Rehman, Aslam & Iqbal, 2022) or* employ VAIC or other similar methods such as VAICTM to analyze the performance of banks, focusing on IC and its influence on different aspects of banks' market position (Cabrita & Vaz, 2006, Mavridis, 2005; Alhassan & Asare, 2016; Goh, 2005; El-Bannany, 2008; Al-Musali & Ismail, 2014; Singh, Sidhu, Joshi & Kansal, 2016; Mohammed & Irbo, 2018; Umanto & Atmoko, 2018; Xu, Haris & Yao, 2019; Neves & Proença, 2021; Yaseen & Al-Amarneh, 2021) or base their research on case studies (Murthy & Mouritsen, 2011; Hosseini & Owlia, 2016; Nawaz & Ohlrogge, 2022). Measuring IC using a survey is still unique (Cabrita & Bontis, 2008; Curado, 2008; Mention & Bontis, 2013). The question of what IC components are essential for building banks' competitive and financial performance is still relevant. The studies consider IC or its components in two ways: as a dependent or an independent variable. The

analysis of IC components applied in the concepts mentioned above from the perspective of a characteristic of banking products and services as well as competition in banking markets led to the conclusion that, as a strategic intangible asset that enables building a long-term sustainable competitive advantage, they should be grouped around three major categories – capital of processes, human capital, and relational capital. Analyzed together as IC, they influence both banks' competitive and financial performance (H1).

During the last few decades, banking markets have experienced turbulent changes caused by globalization, liberalization, technology development, increasing customer expectations and regulatory requirements. On the one hand, fulfilling the regulatory requirements of Basel III concerning the level of capital and liquidity has resulted in increasing costs. On the other hand, the Payment Service Directive (PSD2) has opened the market for non-bank, payment service providers and has resulted in stronger competition. Additionally, a new generation of customers has entered the market. The digital ones' purchase behavior will require adjusting banks' market strategy and business models (First Data Corporation, 2010; Williams & Page, 2011; BMO Wealth Institute, 2014). As a result, maintaining a sustainable market position becomes more and more difficult. It is especially challenging for countries like Poland, where the competition is relatively recent. Even if the first banking houses were established in the 15th century there, and a few banks established over 100 years ago are still operating in the Polish banking market, the Polish history, the loss of independence and the socialist economy resulted in a lack of competitiveness. The banks' market behavior started to change in 1989 after the introduction of a new Act of Banking that enabled the establishment of non-state banks. The market response was immediate. By the end of 1992, there were 54 domestic banks. Since then, mergers and acquisitions have become essential for gaining a more significant market share and restructuring some of them. Poland's entry into the European Union also resulted in cross-border consolidation (Klimontowicz, 2016). Today, 62 commercial banks are operating in the Polish banking market.

The number includes banks established in Poland and credit institutions established in European countries. Over half of them represent foreign capital investments. Mergers and acquisitions influence the number of banks, the sector's ownership structure, and banks' resource base (Chan, Koh & Kim, 2016) and impact market concentration (Kasman, 2010). The market structure may also impact the IC performance (El-Bannany, 2015). The most frequently used measures of banking market concentration are the Herfindahl-Hirschman index (HHI) and the concentration ratio (CR5). They are also considered as an indicator of the level of market competition. The HHI and CR5 ratios level reflect that until 2010 big banks had been

developing their operational activity slower than small and medium-size banks. Since 2010, both indexes have been growing to a small degree but systematically. The data characterizing the Polish banking market (Table 1) shows that the market concentration level is relatively low, which may create new perspectives on further consolidations. The financial markets' uncertainty, strengthened by the COVID-19 pandemic, seems to be the only barrier to large-scale mergers and acquisitions today. The economy of scale will influence the banks' efficiency. As a result, banks operating in Poland diverge in competitive performance measured by market share, market value, and innovativeness, which may affect the influence of IC on banks' financial performance (H2).

Table 1. The structural characteristic of the Polish banking market

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Commercial banks											
Number of domestic banks	46	46	45	43	39	36	36	36	35	32	30
Number of credit institutions	18	21	21	25	28	28	27	27	28	31	32
Market concentration											
HHI	0.574	0.559	0.563	0.568	0.586	0.656	0.670	0.659	0.648	0.691	0.697
CR5	44.2	43.9	44.3	45.0	46.0	48.5	48.8	48.5	47.9	50.0	50.3
Ownership structure											
Number of domestic banks	7	6	8	7	8	8	10	12	14	13	13
Number of foreign banks	57	61	58	61	59	56	53	51	49	50	49
Share of domestic banks' capital	31.9	33.8	35.0	36.4	36,8	38.5	41.0	43.5	54,7	53,2	53,9
Share of foreign banks' capital	68.1	66.2	65.0	63.6	63.2	61.5	59.0	56.5	45,3	46,8	46,1

Source: Own elaboration based on NBP 2007-2020.

Answering the question of how to cope with environmental factors influencing banking business and developing market performance (obtain a competitive advantage and sustainable market position) ensuring the appropriate level of efficiency remains the current research task. In the IC research, banks' financial performance is usually measured by return on assets (ROA) (Yaseen & Al-Amarneh, 2021) and a return on equity ratio (ROE) (Musali & Ismail, 2014; Mohammed & Irbo, 2018). Competitive performance and financial performance represent the two main aspects of overall organizational performance (Kianto, Andreeva, & Pavlov, 2013). In the case of banks, the external factors (competitive environment), such as banking market conditions, other banks' competitiveness and lowering the entry barriers, are thought to be the most important among all factors influencing banks' competitive and financial performance (Özkan-Günay, Günay, & Günay, 2013; El-Bannany, 2015). As a result, the following hypothesis (H3) was formulated, stating that the competitive environment moderates the relationship between IC and banks' competitive performance as well as the competitive performance and

financial performance. As the financial performance measured by the average rate of ROA and ROE change, may also be influenced by the size of the bank and the length of its market activity, the last hypothesis refers to this relationship (H4). The financial performance presents how banks manage their resources to generate profits. ROA shows banks' ability to generate income using assets, while ROE assesses the financial return on a shareholder's investment. That is why those indexes are commonly used as financial performance measures (Al-Musali & Ismail, 2014; Poh, Kilicman, & Ibrahim, 2018; Soewarno & Tjahjadi, 2020; Neves & Proença, 2021; Saymeh, Arikat, Hashem, & Al-Khalieh, 2021; Nawaz & Ohlrogge, 2022).

The IC literature review and analysis of banks' competitive landscape lead to research questions and hypotheses that are the foundation of the conceptual model to investigate IC's contribution to banks' competitive and financial performance. To the authors' best knowledge, any research develops the structure of IC components from the perspective of their ability to create banks' competitive and financial performance. The conceptual model consists of the following variables:

- the independent variable: intellectual capital;
- the mediating variable: competitive performance;
- the dependent variable: financial performance;
- the moderating variable: market environment;
- the control variable: size of the bank and the length of its market activity (the type of bank)

and serves to falsify the following hypotheses that reflect the relationships between the model dimensions and variables (Figure 1):

H1: IC has a strong direct positive impact on both banks' competitive and financial performance.

H2: Competitive performance affects the influence of IC on banks' financial performance.

H3: The competitive environment moderates the relation between the competitive performance and financial performance, as well as the relationship between IC and banks' competitive performance.

H4: The size of the bank and the length of its market activity influences the financial performance measured by the average rate of ROA and ROE change.
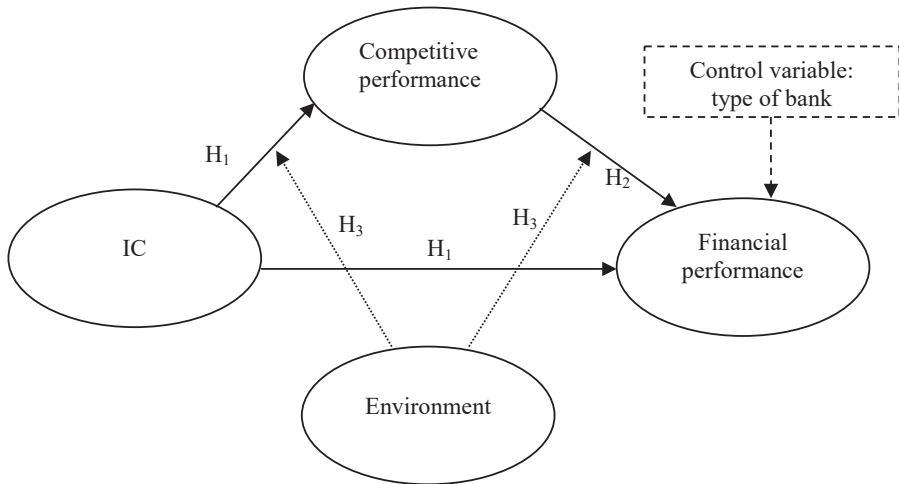
Figure 1. The conceptual model

RESEARCH METHODOLOGY

A two-step approach was implemented to test the hypotheses. The goal of the first step was to create a measurement model and obtain an acceptable fit of the data. In the second step, the structural model was statistically verified based on the measurement model found in the first step. As there is a time lag in the impact of IC on entities' performance (Kujansivu & Lönnqvist, 2007), the data on financial performance were collected over 2012-2019 from banks' annual reports.

Measurement of variables

The development of measurement tools for the variables mentioned above was based on a generalization of the literature review. The verification of content validity employed experts' assistance to determine the contents' fitness, enhance content validity, and ensure questionnaire effectiveness. After interviews with experts, the questions were modified (Joshi, Cahill & Sidhu, 2010; Shih, Chang & Lin, 2010). Therefore, the questionnaire in the field of measuring IC and environment factors should carry a certain degree of content validity.

A set of 45 IC items was proposed to create a suitable IC measurement model. Each of them was assessed from the perspective of its role in building banks' competitive performance. The variables were made operative

according to the Likert seven-point scale (where 7 meant the highest level of importance and 1 – no importance).

The competitive performance was measured by market share, market value, and a bank's innovativeness. Klimontowicz (2016) adopted the scale developed and validated by Deshpandé, Farley and Webster (1993) and Drew (1997) and later used by Lee and Choi (2003). The original scale contains five components and aims to measure the organization's market share, growth, profits, innovativeness, and overall success against its competitors. The market share meant the relation of a bank's assets to the total assets of retail banks operating in Poland. The growth, profits, and overall success were integrated into market value. The market value refers to market capitalization obtained by multiplying the number of the bank's outstanding shares by the current share price. The innovativeness described the bank's ability to exhibit consistently innovative behavior over time, meaning three dimensions: the number of innovations adopted over time, the time of innovations' adoption, and the consistency of the adoption of innovations' time (Subramanian & Nilakanta, 1996). The executive managers assessed the bank's competitive performance in comparison with other retail banks. Each variable was measured using the Likert seven-point scale (where 7 meant being significantly better and 1 being significantly worse than competitors).

Following Al-Musali and Ismail (2014), banks' financial performance was measured by a return on assets ratio (ROA) and a return on equity ratio (ROE). ROA reflects the efficiency of utilizing available assets in creating profits and it is calculated as the annual net profit of an individual bank divided by average total assets. ROE measures bank profitability by revealing how much profit a bank generates with the money invested by shareholders. Both ratios are commonly applied as measures of financial performance in IC research (Al-Musali & Ismail, 2014; Poh, Kilicman & Ibrahim, 2018; Soewarno & Tjahjadi, 2020; Neves & Proença, 2021; Saymeh, Arikat, Hashem & Al-Khalieh, 2021; *Rehman, Aslam & Iqbal, 2022*). The impact of IC on further financial performance was measured by the average ROA and ROE change rate over 2012-2019 for each bank separately.

The environment was measured by 21 items considered essential influencers in the banking market during the last few decades. They were made operative according to the Likert seven-point scale (where 1 meant no influence on the bank, 7 – very high impact on the bank).

Following the Polish banking characteristics, for control variables, the size of the bank (Shiu, 2006; Chan, 2009; Al-Musali & Ismail, 2014; El-Bannany, 2015) and the length of market (El-Bannany, 2015) activity were used. The size of the bank was measured by the level of capital and the total assets. Some researchers chose only large banks as a sample (Curado,

2008; El-Bannany, 2008). Analysis of the Polish banking market concentration showed that the largest banks do not always have a dominant position in the market. Thus, the size of the bank may influence market performance and efficiency. Concurrently, substantial differences concerning the length of market activity characterize the banking market. Shih, Chang, and Lin (2010) focused on the banks' ownership. Their research sample included privately owned commercial banks, state-owned banks, and cooperative banks. As the vast majority of Polish banks are privately owned, there is no rationale to use ownership as a control variable in the case of the Polish banking market.

Research methods

Structural equation modeling (SEM) was implemented to examine the conceptual model. The choice of SEM is justified because of the need to test an integrated set of dependence links, distinguish between direct and indirect effects, and account for the measurement errors of the multi-item constructs (Anderson & Gerbing, 1988).

Two steps were scoped to read the SEM model (Barclay, Higgins, & Thompson, 1995): 1) an analysis of measuring model and 2) an analysis of structural model. A measurement model represents the relationships between constructs and their corresponding indicator variables, while the structural model tests all the hypothetical dependencies based on path analysis.

Exploratory and confirmatory analyses were conducted to construct and check the reliability and validity of the proposed IC and environment measuring scales. A specific dataset, where the number of variables is higher than the number of observations, forced the search for non-classical approaches to extract IC and environment components. Therefore, the Principal Axis Factor Analysis (PAF) implemented in the high dimension molecular data (HDMD) package in the R environment was applied (McFerrin, 2013). PAF is similar to principal components analysis, but a reduced matrix where the diagonals are the commonalities is taken into account (Revelle, 2013). For data with more variables than observations, the covariance matrix is singular, and a general inverse is used to determine the inverse correlation matrix and estimate scores. In this case, the principal axis factor method of analysis allows estimating commonalities by iteratively updating the diagonal of the correlation matrix and solving the eigenvector decomposition (McFerrin, 2013). Commonalities for each variable are estimated according to the number of factors, and convergence is defined by stabilizing total commonalities between iterations.

The analysis assessed (1) the effects of IC on financial performance (both directly and indirectly, through competitive performance), (2) the

effect of IC on competitive performance (as moderated by environment), and (3) the effect of competitive performance on financial performance (as moderated by event environment). Thus, the structural model with moderated mediation effects is analyzed. In general, the moderated mediation effect indicates the presence, in a single model, of one or more mediating variables and one or more moderating variables. A moderator variable interacts with a mediator variable such that the value of the indirect effect changes depending on the value of the moderator variable (such a situation is also referred to as a conditional indirect effect) (Hair, Hult, Tomas & Ringle, 2017). A conceptual and statistical model of a conditional process can be found in Hayes (2013) (model 58). Both mediation and moderation effects are tested simultaneously using a structural equation method. A general model to test these effects is created to include all possible interactions between variables in the mediation and moderation models (MacKinnon, 2008). The PLS-SEM algorithm (The Partial Least Squares Structural Equation Modelling) was selected for estimating the relationships in a structural equation model. PLS path modeling is a soft-modeling technique with less rigid distributional assumptions on the data. Research by other authors (e.g., Goodhue, Lewis, & Thompson, 2012) indicates that PLS-SEM performs as effectively as the other techniques in detecting actual paths and not falsely detecting non-existent paths when analyzing small sample sizes or data with non-normal distributions. The structural relationships were measured using PLS-SEM bootstrapping to achieve the significance of the correlation. The number of cases used was 5000 samples for the bootstrapping procedure (Hair, Ringle, & Sarstedt, 2011).

The IC, competitive performance and market environment are modeled based on a reflective measurement model. The financial performance is a composite variable and it serves as a construct. Considering all of the above, we are dealing with the reflective-formative, the second-order hierarchical component model.

Evaluation of reflective measurement models were assessed using composite reliability (the reliability), whereas validity is evaluated using the convergent validity (average variance extracted, AVE) and discriminant validity following the Fornell-Larcker criterion. After reliability and validity are established, the primary evaluation criteria for PLS-SEM results are the coefficients of determination (R^2) as well as the size and significance of the path coefficients. Besides the f^2 effect sizes, predictive relevance (Q^2), and the q^2 effect sizes give additional insights into the quality of the model estimations (Hair, Hult, Tomas, & Ringle, 2017).

Data collection and sample

The dataset used to explore the research hypotheses covers 2012-2019. The empirical study on IC was conducted in 2012. The data collected for the assessment of financial performance were retrieved from banks' annual reports and referred to each year from 2012 to 2019.

The survey's target group consisted of all retail banks operating in Poland, defined as banks that offer a broad range of financial services to different segments of individual customers and fulfill all their financial needs and expectations. According to this definition, among the retail banks' features differentiating them from other banks is the broad range of distribution channels, products, and services dedicated to individuals. Their operating activity's financial sources (liabilities) are based on customers' deposits. They are primarily used in developing loans and credit products (assets). Questionnaires were spread among high-level managers responsible for organizational development, who know the bank's competencies and capabilities. The research was conducted under the auspices of the Polish Banks Association and the National Science Centre. The data was collected by two methods – PAPI (personal and pencil interviews) and CAWI (computer-assisted web interviews). 37.9% of banks' executive managers responded to the research invitation and filled in a questionnaire correctly (the total number of retail banks operating in the Polish banking market in 2012 was 29). A similar sample size was applied in other research conducted in European banking markets (e.g., Neves & Proença, 2021; Anielak-Sobczak, 2022). All the questionnaires were completed by senior (54.5% of the respondents) or middle-level (45.5%) managers.

The sample included banks established in Poland and credit institutions operating in the Polish banking market but established in European countries. The list of banks that conformed to this definition is presented in Table 2.

The number of samples is accurate for applying multiple regression analysis of the SEM-PLS model. The statistical power of the sample using Cohen's retrospective test (1992) was carried out as it was suggested in Hair, Hult, Tomas, and Ringle (2017). As the number of independent variables in the measurement and structural models is two, we need 11 observations to achieve a statistical power of 80% for detecting R^2 values of at least 0.5 with a 5% probability of error.

Table 2. The list of retail banks operating in Poland (the target population)

Banks	
Alior Bank SA	Eurobank SA
Bank BPH SA	FM Bank SA
Bank DnB Nord Polska SA	Getin Noble Bank SA
Bank Gospodarki Żywnościowej SA	Idea Bank SA
Bank Handlowy w Warszawie (CitiHandlowy)	ING Bank Śląski SA
Bank Millenium SA	Invest Bank SA
Bank Ochrony Środowiska SA	Kredyt Bank SA
Bank Pocztowy SA	Meritum Bank ICB SA
Bank Polska Kasa Opieki SA	Nordea Bank Polska SA
Bank Polskiej Spółdzielczości SA	PKO Bank Polski SA
Bank Zachodni WBK SA	Polbank EFG SA
BNP PARIBAS SA Oddział w Polsce	Raiffeisen Bank Polska SA
BRE Bank SA	Santander Consumer Bank Polska SA
Credit Agricole Bank Polska SA	SGB Bank SA
Deutsche Bank Polska SA	

Altogether, the sample banks' assets represented 79.4% of total Polish banking sector assets. The total assets of banks that responded to the questionnaire correctly equaled PLN 561 205 million, which corresponded to 61.01% of all sample banks and 48.44% of all banks operating in the Polish banking market. The structure of the assets was as follows: 54.5% accounted for domestic capital, while 45.5% accounted for foreign capital. Such a structure corresponded to the capital structure of the Polish banking system. Over half of the banks that participated in the research were medium-sized and large banks with assets exceeding PLN 20 billion. The sample structure in terms of the value of assets is presented in Table 3.

Table 3. The structure of the sample in terms of the value of assets

The value of sample banks' assets (in billion)	The share in the research sample (in %)
1-5	9.1
5.1-10	9.1
10.1-20	27.3
20.1-50	18.2
over 50	36.4

The sample included banks with over a hundred years of tradition, banks established after 1989 and those found in the current century. These groups are represented evenly – 36.4% of the surveyed banks started operating before the political transformation, 27.3% in the 1990s, and 36.4% after 2000.

The sample was also diversified considering the banks' number of employees and the number of branches (Tables 4 and 5).

Table 4. The structure of the sample in terms of the number of employees

The number of employees (in thousands)	The share in the research sample (in %)
less than 1	9,1
1.1-5	36.4
5.1-10	18.2
Over 10	36.4

Table 5. The structure of the sample in terms of the number of branches

The number of branches	The share in the research sample (in %)
less than 50	9.1
51-100	9.1
101-200	9.1
201-300	9.1
301-500	27.3
over 500	36.4

Considering the retail banks' features, such as the value of assets, banks' territorial scope and business profile, the year of banks' establishment, the number of employees and branches, and persons filling in the questionnaire, the analyzed sample may be considered representative.

RESULTS AND DISCUSSION

The analysis of the measuring model

The factor analysis was applied to answer the question concerning IC components and their importance in creating value for customers and gaining a competitive advantage in the market (competitive performance and efficiency). The results identified three dimensions of IC and three dimensions of the environment. From 45 items designed to measure IC, 28 items remained: 12 items loaded the capital of processes, 7 items loaded human capital and 9 items loaded relational capital. Three factors of IC account for 72.3% of the item variance, with the first factor (Capital of Processes) which explains 40.7% of the total variance. The results of the factor composite reliability, Cronbach's α and AVE, are superior to the limits set in the literature (i.e., Cronbach's α≥0.7; composite reliability≥0.7, AVE≥0.5) (Roldán & Sánchez-Franco, 2012).

Table 6 introduces the items representing the variables and factor loadings concerning IC (only items with a factor loading at least 0.70 are considered).

Table 6. Reliability of measurement IC scale

Latent variables and scale items	Loading	Composite reliability	Cronbach α	AVE
Capital of Processes (PC)				
The level of service modernity	0.814			
The investment in innovations	0.844			
The implementation of innovative products	0.791			
The implementation of innovative procedures	0.883			
The usage of technology in bank's management	0.821			
The investment in marketing	0.737	0.963	0.885	0.765
The number of employees	0.770			
The efficiency and timeliness of services	0.828			
The usage of traditional distribution channels	0.931			
The usage of modern distribution channels	0.884			
The safe and comfortable way of transactions authorisation	0.850			
The number of ATMs	0.841			
Human Capital (HC)				
The will of cooperation and knowledge sharing	0.783			
The quality of executive management	0.953			
The quality of middle level management	0.966			
The level of managers' acceptance	0.936	0.949	0.871	0.773
The quality of the motivation system	0.878			
The quality of leadership	0.926			
The knowledge of clients' needs	0.867			
Relational Capital (RC)				
The brand value	0.708			
The employees' knowledge and the level of education	0.804			
The employees' identification with the bank's objectives	0.894			
The level of knowledge regarding a bank and its offer	0.722	0.945	0.892	0.627
A customer-oriented attitude	0.773			
The ability to develop long-term relations with clients	0.775			
The willingness to self-development	0.872			
The level of employees' innovativeness	0.701			
The branches' organisation and working hours	0.819			

Among the three dimensions of IC identified (capital of processes, human capital, and relational capital), the capital of processes presents the highest potential for creating bank's competitive advantage. This finding does not correspond with some previous research conducted on the banking market that showed the dominance of human capital over the other IC components (e.g., Curado, 2008; Al-Musali & Ismail, 2014). But the internal structure of this IC dimension shows the importance of using technology and implementing innovations. Thus, the results correspond with studies that positively verified the relation between innovation capital and firms' performance (Shih, 2008; Tseng, Lan, Lu & Chen, 2013) and market predictions concerning customers' adoption of technology and innovations (First Data Corporation, 2010; Williams & Page, 2011; BMO Wealth Institute, 2014).

The internal structure of human capital reveals the significance of management and knowledge sharing for building banks' competitive performance. The impact of IC strategic management on value creation was also found by Kianto, Andreeva and Pavlov (2013). The findings correspond with Shih, Chang, and Lin (2010), who pointed out the importance of exchanging and sharing information in banks. It is also consistent with the conclusion that creating knowledge variety is the most critical activity in the management of IC (Schiuma & Lerro, 2008). The results proved the role of relational capital in the process of building banks' competitiveness. The internal structure of this IC corresponds with factors influencing customer loyalty in the banking sector (Skowron & Kristensen, 2012).

For the environment, 10 items remain from the original 21. The first dimension presents variables influencing the banking market conditions (5 items), the second consists of items referring to the market activity and the competitive strength of other banks (3 items) and the third one presents variables connected with entry barriers (2 items). Three dimensions of environment account for 64.9% of the total variance, with the first category explaining 30.3% of the total item variance. Table 7 introduces the environmental items representing the variables and factor loadings. The dimensions of environmental factors pointed out the importance of market conditions, the competitors' strengths and entry barriers. This result coincides with previous market-based concepts that assumed market factors as determinants of firms' competitive advantage (Porter, 1990; Acur & Bititci, 2004; Rumelt, 1991; Obłój, 2007).

Table 7. Reliability of the measurement environment scale.

Latent variables and scale items	Loading	Composite reliability	Cronbach alpha	AVE
Banking Market Conditions (BMC)		0.900	0.832	0.766
The establishment of new banks	0.727			
The situation in financial markets	0.760			
The market capacity	0.824			
The number of competitors	0.885			
The technological progress	0.747			
Other Banks' Competitiveness (OBC)		0.878	0.787	0.506
The competitive strength of other banks	0.871			
The level of customers' loyalty	0.839			
The competitors' pricing policy	0.810			
Entry Barriers (EB)		0.815	0.795	0.526
The equity relationships	0.849			
The deregulation of financial markets	0.702			

The competitive performance construct is composed of three items (market share, market value and a bank's innovativeness) with these values of indicators: Cronbach's α = 0.85, composite reliability = 0.84, AVE = 0.61. All factor loadings are higher than 0.8.

As the financial performance is a composite variable, hence no quality of measurement in the actual sense of the word takes place. Discriminant validity was calculated to observe to which extent a factor indeed differs from others (Hair Jr, Sarstedt, Hopkins & Kuppelwieser, 2014). To get such results, each factor's AVE square root values were compared with the correlations between constructs associated with these factors (Fornell & Larcker, 1981). All cases (Tables 8 and 9) show values on the diagonal higher than corresponding correlations.

Table 8. Discriminant validity of dimensions of IC[a]

IC dimensions	Capital of Processes	Human Capital	Relational Capital
Capital of Processes	**0.875**		
Human Capital	0.373	**0.879**	
Relational Capital	0.491	0.300	**0.792**

Note: [a]AVE square root has been calculated on the diagonal (in bold).

Table 9. Discriminant validity of dimensions of environment [a]

Environment dimensions	Banking market conditions	Other Banks' Competitiveness	Entry Barriers
Banking Market Conditions	**0.875**		
Other Banks' Competitiveness	-0.050	**0.711**	
Entry Barriers	0.373	-0.109	**0.725**

Note: [a]AVE square root has been calculated on the diagonal (in bold).

The results mean that indicators displayed to measure the different given factors are reliable and have discriminant validity. Therefore, the analysis suggests that the scales possess composite, convergent, and discriminant validity.

The assessment of the structural model

The first step of the structural model's assessment relied on verifying the direct relationship between IC and financial performance. The effect obtained is positive and significant (β=0.224, $p<0.05$). In the second step, the mediator effect (i.e., competitive performance) was included. This indirect effect is positive and significant (between IC and competitive performance: β=0.316, $p<0.001$, and competitive performance and financial performance: β=0.320, $p<0.001$). The relationship between competitive performance and financial performance is not fully mediated according to the variance accounted for (VAF) index (Goodhue, Lewis & Thompson, 2012), resulting in a value of 0.418 (which is lower than 0.800 for total indirect effect – full mediation and higher than 0.200 for no mediation). The mediation effect did not eliminate the direct relationship between IC and financial performance. IC impacts 12.6% of the variance in competitive performance, which is quite significant, considering how many other issues affect the competitive performance of banks. The results of the structural model analysis are presented in Table 10.

The moderator effect, an environment of banks, was included in the next step to compare IC and competitive performance (first moderator effect) and the relation between competitive performance and financial performance (second moderator effect). The moderator effect of the environment is present in both relations. The moderator effect increases the explained variance of financial performance by 13%, confirming the double moderator effect of the environment of the proposed model. It is worth stressing that its absolute effect on financial performance is stronger than on competitive performance (Figure 2).

Table 10. Path analysis of the structural model

Path	Path coefficient Beta	R^2	*p*-value
Direct effect			
IC→FP	0.224	0.049	**
Mediation effect			
IC→FP	0.217		**
IC→CP→FP	0.294	0.372	
IC→CP	0.316	0.126	***
CP→FP	0.320		***
Conditional mediation effect			
IC→FP (c)	0.201		**
IC→CP (a)	0.652		***
CP→FP (b)	0.237		**
I.C.*E→CP*E→FP		0.503	
IC*E→CP (a_1)	0.227	0.145	**
C.P.*E→FP (b_1)	0.219		**

Note: ***$p<0.001$; **$p<0.05$.
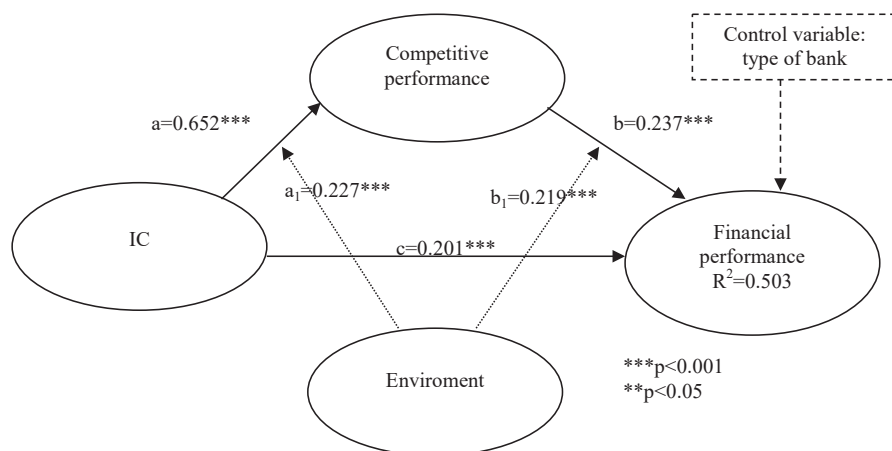
Figure 2. Conditional mediation model

Considering this, the control variables (the size of the bank and the length of its market activity) are relevant and significant (coefficients are above 0.2, see Table 11).

Table 11. Control variables in the structural model

Variable	Beta	t-test
Size of the bank	0.310	6.102
Length of banks market activity	0.218	8.327

The statistical assessment of the conceptual model describing the contribution of IC to banks' competitive and financial performance verified the assumptions that have grown from a literature review. A summary of hypotheses is as follows (all hypotheses are confirmed):

H1: IC positively affects competitive and financial performance. The impact of IC on financial performance explains only 4.9% of the variance of financial performance and 12.6% of the variance of competitive performance. A similar level was considered by Kianto, Andreeva, and Pavlov (2013) as quite significant, considering how many other issues affect competitive performance. The results are coherent with other studies examining the IC impact on financial performance (e.g., Neves & Proença, 2021; Yaseen & Al-Amarneh, 2021; Nawaz & Ohlrogge, 2022; *Rehman, Aslam & Iqbal, 2022) and competitive performance measured by market share (e.g., Rehman, Aslam & Iqbal, 2022) although they applied research methodology.*

H2: Competitive performance has a moderator effect on the relationship between IC and financial performance. This effect leads to an increase up to 37.2% of this model's capacity to define the explained variance of financial performance.

H3: Environment moderates positively the relationship between IC and competitive performance, as well as the relationship between competitive performance and financial performance. Findings suggest that the strength of moderation between IC and competitive performance is slightly weaker than the relationship between competitive performance and financial performance. It means that the environment plays a significant role in financial performance assessment. The created model (with competitive performance as moderator and environment as the mediator) explains 50.3% of the variance of financial performance. In the case of banks, the results show that applying the resource-based theory might not be sufficient to gain a competitive advantage and sustainable market position. Banks' financial performance depends not only on the ability to manage intangible (IC) and tangible assets but also on fulfilling regulatory requirements and managing different kinds of

risks (Holland, 2010). The impact of such external determinants of IC as a market structure was also investigated and proved by El-Bannany (2015).

H4:   The size of the bank and the length of its market activity influences the financial performance measured by the average rate of ROA and ROE change. It is coherent with previous hypothesis verification, as fulfilling regulatory requirements is strictly connected with the level of capital and assets.

CONCLUSIONS

The paper presents the contribution of intellectual capital to banks' competitive and financial performance. In designing the performance measurement system of the individual components of the proposed structural model, it was necessary to adjust them to specific characteristics of the banking sector. It helped find those components that can drive organizations to a higher degree of competition by improving the value creation process.

Among the three dimensions of IC identified (capital of processes, human capital, and relational capital), the capital of processes presents the highest potential for creating a bank's competitive advantage. The findings extended the knowledge on IC structure and proved the necessity to conduct systematic research on their importance for creating value for customers and gaining competitive advantage. Due to changing environmental conditions in the banking market, particular IC components' importance is changing. The dominance of human capital over the other IC components proved in previous research has not been confirmed. Today, the capacity to use technology and implement innovations seen in the capital of processes is much more critical. But still the management and knowledge sharing contribute significantly to banks' value creation and competitive performance. The results proved the role of relational capital in the process of building banks' competitiveness. The internal structure of this IC corresponds with factors influencing customer loyalty in the banking sector.

The research results pointed out the importance of market conditions, the competitors' strength, and entry barriers, which has a huge impact on the theoretical foundation of further IC research. It seems irrelevant to apply only the resource-based theory anymore. A new attitude combining both resource-based and market-based approaches is needed.

The results proved the positive IC impact on banks' competitive and financial performance. It must be stressed that the relationship between IC and financial performance is moderated by competitive performance. In

contrast, the relationship between IC and competitive performance and the relationship between competitive performance and financial performance is moderated by the environment that has practical implications for banks. Their financial performance depends not only on the ability to manage intangible (IC) and tangible assets but also on addressing the environmental challenges, such as fulfilling regulatory requirements and managing different kinds of risks. The results confirmed that the environment plays a significant role in financial performance assessment. They also pointed out that in the banking market the size of the bank (the level of capital and assets) and the length of its market activity influences the financial performance measured by the average rate of ROA and ROE change.

The long journey from a transition economy and banking market into a developed one may be an inspiration for both entities operating in other emerging and transition countries, as well as entities entering and investing in those markets. Building competitiveness and managing efficiency depend on understanding which factors should be the foundation for market strategy. The results lead to new insights for banks' decision-makers concerning factors that should be taken into account in the process of creating value for customers and gaining a competitive advantage. Shifting the importance to the capital of processes from other IC dimensions has practical implications for further technological investments. Meeting market challenges requires developing adequate managerial skills and focusing on factors that help build long-relations with customers. When making market decisions, managers should consider environmental factors that impact and strengthen the IC impact on competitive and financial performance.

This study is not free of limitations. The retrieved data cover the period from 2012 to 2019 and does not include the pandemic and Ukrainian war, which may impact the result. Thus, future research is needed to check if IC is also supporting competitive and financial performance in such an unpredictable situation. Future studies may cover other European banking markets enabling the results' comparison. Today most of the research applies the VIAC and similar methodology that makes discussing the results difficult. Thus, the above study will constitute an important point of reference for future surveys.

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Abstrakt

CEL: *Celem artykułu jest zbadanie wpływu kapitału intelektualnego na konkurencyjność i efektywność banków.* **METODYKA:** *W artykule wykorzystano dane pozyskane w wyniku badań ankietowych przeprowadzonych wśród kadry zarządzającej banków detalicznych działających na polskim rynku bankowym oraz danych wtórnych publikowanych przez NBP. Dane zostały przeanalizowane z wykorzystaniem analizy czynnikowej (Principal Axis Factor Analysis - PAF) i modelowania równań strukturalnych (Partial Least Squares Structural Equation Modeling - PLS-SEM).* **WYNIKI:** *Przeprowadzone analizy wykazały, że konkurencyjność i efektywność rynkowa banku zależy zarówno od kapitału intelektualnego, jak i czynników środowiskowych. Związek między efektywnością działania a jego kapitałem intelektualnym jest pozytywnie moderowany przez pozycję konkurencyjną banku, przy czy otoczenie konkurencyjne może wpływać na siłę tego związku. Uzyskane wyniki pokazują, że w przypadku banków oparcie budowania przewagi konkurencyjnej i trwałej pozycji rynkowej jedynie na zasobach banku może nie być wystarczające ze względu na specyfikę otoczenie rynkowego.* **IMPLIKACJE:** *Wyniki przeprowadzonych badań wskazują zarządzającym bankami jakie czynniki powinny być brane pod uwagę w procesie tworzenia przewagi konkurencyjnej, osiągania satysfakcjonujących wyników rynkowych i efektywności. W ciągu ostatnich kilkudziesięciu lat polski rynek bankowy stał się bardzo konkurencyjny, co może być inspiracją dla innych banków działających na rynkach wschodzących Ich konkurencyjność zależy bowiem od zrozumienia, jakie czynniki powinny stanowić podstawę ich strategii rynkowej oraz ich konkurencyjności i efektywności.* **ORYGINALNOŚĆ I WARTOŚĆ:** *Większość badań dotyczących kapitału intelektualnego prowadzonych jest w krajach rozwiniętych. Natomiast stosunkowo niewiele wiadomo na temat krajów rozwijających się i przechodzących transformację. Ponadto większość z nich skupia się na identyfikacji i pomiarze komponentów IC oraz relacji między nimi. Badanie w jakim stopniu kapitał intelektualny wpływa na wyniki i efektywność działania banków na wschodzących rynkach bankowych są stosunkowo rzadkie. Według najlepszej wiedzy autorów jest to pierwsze badanie przeprowadzone na jednym z europejskich rynków bankowych, w którym empirycznie zbadano związek między kapitałem intelektualnym, otoczeniem konkurencyjnym oraz wynikami i efektywnością działania na przestrzeni kilku lat.*

Słowa kluczowe: *kapitał intelektualny, pozycja konkurencyjna, efektywność banków, analiza czynnikowa, modelowanie równań strukturalnych*

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Conflicts of interest

The authors declare no conflict of interest.

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