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THE CAUSAL RELATIONSHIP BETWEEN INTELLECTUAL CAPITAL AND FINANCIAL PERFORMANCE

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Purpose: The purpose of this article is to present a synthesis of the existing body of research on intellectual capital (IC) as an interdependent construct, correlative with other economic categories, and to identify the trend in the causal relationships between intellectual capital and these economic categories. A precise identification of these causal relationships is gaining particular importance during the periods of discontinuity and instability, and the identified regularities in this regard should be perceived as the source of development of the intellectual capital management theory.
Design/methodology/approach: The paper is the result of a literature review and text analysis of papers indexed in the Web of Science database and published during the years 2000-2022.
Findings: Model approaches to the causal relationships between intellectual capital and the economic performance of companies justify the need to develop a research on the intellectual capital across different industries. Neither theoretical reasoning nor empirical solutions, obtained thus far in this area, have been unambiguous in the manner we would expect. While the results of the research indicate that, irrespective of the affiliations to particular industrial sectors, a positive causal relationship may be observed between intellectual capital and the financial situation of companies, it is but difficult to make any broader generalisations, as the research underway focuses, first of all, on stock-listed companies in the financial sector, high-tech enterprises and entities in the pharmaceutical sector. It may then be assumed that regional, national and sectoral circumstances are not without influence on the development of the relationships studied at companies of other industries as well.
Research limitations: Regarding unlisted companies, the issue of diagnosing a causal relationship among the variables under study eludes scientific explanation. Limitations in this respect may often be derived from the method used to measure intellectual capital. It is rather difficult to make a firm, unambiguous conclusion, taking into account merely some snapshots from the survey of organisations in a few industries only. The possibility to explore the causal relationships, which occur between intellectual capital and the financial situation of small enterprises or non-profit organisations requires the development of methods of valuation and assessment of intellectual capital, customised to their specific characteristics.
Practical implications: The Value Added Intellectual Coefficient method can be used as an important tool by the decision makers in the knowledge economy to integrate the intellectual capital in the decision making process.
Originality/value: Both the existing regularities and the established facts should be perceived as the sources for the development of the theory of intellectual capital management, particularly in relation to stock-listed companies. A synthesis of the intellectual capital research output

shows that changes in the research structure and in the operationalisation of variables result in differentiated outcomes.

Keywords: causality, dependent variable, intellectual capital, impact, firm performance.

Category of the paper: Literature review.

1. Introduction

Explaining phenomena and isolating cause-effect relationships, which occur within the framework of a particular field of knowledge is one of the objectives of scientific cognition. The category of cause-effect relationships, broadly observed in nature, was referred to as far back as in the antiquity (among others, by Aristotle). Philosophical reflections on the issue of causality were undertaken by Descartes, Hume or Locke. Over time, it became a requirement of the theory of causality to be able to describe any cause-effect relationship by means of

the language of mathematics. Many researchers still emphasise the importance of causality in scientific explanation. In the philosophy of science, the term causality covers a vast and very intricate complex of issues. The major theories, defining the concept of causal relationships, as they relate to quantitative social research, include the Rubin-Holland model (Holland, 1986, pp. 945-960), Structural Causal Model (Pearl, Mackenzie, 2018) of the Scientific Model of Causality, proposed by Heckmann (2008, pp. 1-27). Out of the works, dealing with the problem of causal relationships, the works of Bunge (1959) or Dowe et al. (2004) should be singled out.

Czakon (2015, p. 12) emphasises that still the problem of causality responds to explanatory and predictive aspirations and translates into practical applications of theory.

In the sciences on management, the precise identification of these causal relationships is gaining particular importance during the periods of discontinuity and instability. On one hand, an issue emerges, regarding the impact of environmental dynamics on possible changes in the trend of the causal relationships identified so far (Olbryś, Majewska, 2014), making the identification and interpretation of these relationships are rather not obvious. On the other hand though, the diagnosis of causal relationships is relevant for the management decision making process.

This article attempts to contribute to the observed extensive discussion in the literature on the causality in intellectual capital research. The majority of the cognitive objectives, pursued in research in this area, are also directly or indirectly related to causal research. The interest in the intellectual capital, both in theory and practice, may stem primarily from its relationship to purely economic categories, such as financial performance or the value of a company. A number of relationships in this regard are formulated, described and explained in scientific projects. Despite the growing number of publications, there is still a lack of systematic literature reviews, which would indicate whether and how the identified relationships have evolved over time and

to what extent these relationships are universal and unambiguous. Both the existing regularities and the established facts should be perceived as the sources for the development of the theory of intellectual capital management. A need, therefore, emerges to synthesise the hitherto identified but highly dispersed relationships into new research perspectives.

The purpose of this article was to present a synthesis of the existing body of research on intellectual capital (IC) as an interdependent construct, correlative with other economic categories, and to identify the trend in the causal relationships between intellectual capital and these economic categories.

2. Literature review

Structuring and clarifying of multifaceted considerations, regarding the causal relationships of intellectual capital require constant updating in consideration of the changing organisation circumstances. The literature proposes more or less adequate research models. The distinction between the causal factors (causes) and the effects of their occurrence (consequences) is fundamental to the validity of the proposed models (Strawiński, 2007, p. 3). Thus, the following two main categories of variables are considered (Zakrzewska-Bielawska, 2018, p. 15):

- dependent variables - are those variables that the researcher wants to explain. They provide the outcome and undergo changes, depending on the effects independent variables.
- Independent variables - these are the variables that cause changes in dependent variables.

The categories of variables that may additionally appear in the model include mediating or control variables.

In their model approaches, the authors assume that IC is the causal factor, while the dependent variables include the financial situation of the company, the profitability, the Return On Assets (ROA), the Return On Equity (ROE), the Market-to-book value ratio, the Sales growth, the Asset Turnover Ratio (ATO) or the value of the organisation.

The concept of intellectual capital (IC) itself is multidimensional in its character. The research of Edvinsson and Malone was a breakthrough for the development of the concept of intellectual capital. IC means knowledge (Edvinsson, Malone, 1997). In line with the position of the European Commission (2006), 'IC is the combination of intangible resources and activities…". In Stewart's perspective (1997), intellectual capital is something, you cannot touch, but it can make you rich. The IC is seen as a specific corporate resource, standing out from the rest and requiring special treatment. This specific resource is the focus of interest of many researchers. Literature studies even indicate that the logic of value creation has changed (Cabrita, 2009, p. 229) and IC has become a conceptual category used in problem analyses of

almost all fields of activity. It should be clearly emphasised that intellectual capital is not a new issue but has a history. Financial analysts used the term IC already in 1958 when discussing the stock market value of a company and its success in the stock market, claiming that the economic success had been due to that intangible resource (Itami, 1987). This makes the development of the concept of intellectual capital and its value-creating role all the more justified. The process of managing intellectual capital (including human capital) is supposed to lead to value and goodwill creation for the company (Baron, Armstrong, 2008, p. 42). The business justification for intellectual capital management activities can be found in numerous works (Bontis, Brooking, Roos, Sullivan, Wiig). Table 1 presents selected concepts of intellectual capital.

Table 1.
Selected concepts of intellectual capital

Author	Concept
Brooking, 1996	Intellectual capital is the sum of market assets, intellectual value, infrastructural assets and human resources.
Stewart, 1997	Intellectual capital is the sum of all knowledge owned by all organizational units, providing the company with a competitive edge.
Lowendahl, 1997	Intellectual capital means competences and physical resources.
Wiig, 1997	Intellectual capital consists of assets resulting from intellectual actions extending from new knowledge acquisition to investments and establishment of valuable relationship with other.
Ulrich, 1998	Intellectual capital is the product of competence and motivation.
Wang, 2008	Intellectual capital - a key value driver of firms operating in the new economy and has become a most powerful factor for those companies in enhancing their competitive competence and achieving corporate success.

Source: own study based on: Brooking(1996), Stewart (1997), Lowendahl (1997), Wiig (1997), Ulrich (1998), Wang (2008).

Researchers formulate, describe and explain the relationships that exist between IC and economic performance, using more or less adequate research models. Models in scientific research are a specific form of cognition, performing theoretical (providing a particular picture of reality) and practical functions (they are tools in conducting empirical research (Szarucki, 2011, p. 268). However, organisational reality eludes the model view. It therefore becomes legitimate to continuously analyse and synthesise the constructing economic reality. This complex strategic resource affects the functioning of companies, societies and individuals.

In response to the need for IC valuation, several methods to measure intellectual capital and its performance have been developed by various researchers, for example, Skandia IC Report Method (Edvinsson, Malone, 1997), Value Added Intellectual Coefficient Model (Pulic, 2000), and Intangible Asset Monitor Approach (Sveiby, 1997). Among these methods, Pulic's VAICTM is widely adopted by academics and practitioners as a method to measure IC and reflect the market value of corporations

3. Methods and result

While taking up the challenge to diagnose causal relationships in IC research projects, it became necessary to obtain reliable sources of credible data in this particular area.

The starting point was to identify the primary literature on the subject, using the Web of Science database. The literature selection was carried out, using the keywords 'intellectual capital', 'financial performance' and 'relationship' and 'impact'. Narrowing simultaneously the search area to 'Economics' or 'Management' yielded as many as 152,056 records. The following items were excluded in the subsequent step: proceeding papers, notes, letters and editorial materials. That was followed by a contents analysis of 113 articles (during which a further ten records were excluded). Eventually, the data were collected, necessary for further inference. Table 2 presents a synthetic review of studies on intellectual capital relationships and financial performance. The most cited items are listed first.

Table 2.
Review of selected studies on the relationship between IC and the economic performance of enterprises

Author, year, country	Scope of research	Used methods	Dependent variables	Independent variable	Result
Chen et al., 2005 (Taiwan)	4,254 data records, banking sector	Ordinary Least Squares Model	Financial performance ROA, ROE	Value added intellectual coefficient	positive relationship
Maditinos et al., 2011 (Greece)	96 listed companies, various sector	Ordinary Least Squares Model	Financial performance, Market-to-book value ratio	Value added intellectual coefficient	positive relationship
Clarke et al., 2011 (Australia)	18 companies, banking sector	Ordinary Least Squares Model	ROA, ROE	Value added intellectual coefficient	positive relationship
Wei Kong Ting et al., 2009 (Malaysia)	20 companies, financial sector	Ordinary Least Squares Model	ROA	Value added intellectual coefficient	positive relationship
Nimitrakoon, 2015 (Association of South-East Asian Nations)	213 listed technology companies	Ordinary Least Squares Model	Financial performance, ROA	Modified intellectual capital efficiency	positive relationship
Kamath, 2008 (India)	25 companies, pharmaceutical sector	Ordinary Least Squares Model	ROA, ATO	Value added intellectual coefficient	positive relationship
Mondal, Gosh, 2012 (India)	65 companies, banking sector	Ordinary Least Squares Model	ROA, ROE, ATO	Value added intellectual coefficient	varied result
Joshi et al., 2013 (Australia)	40 companies, banking sector	Ordinary Least Squares Model	ROA	Value added intellectual coefficient	varied result

Cont. table 2.

Ghosh, Mondal, 2009 (India)	80 companies, software and pharmaceutical sector	Ordinary Least Squares Model	Financial performance, ROA, ATO	Value added intellectual coefficient	varied result
Ozkan et al., 2017 (Turkey)	44 companies, banking sector	Ordinary Least Squares Model	Financial performance, ROA	Value added intellectual coefficient	positive relationship
Khan et al., 2018	329 enterprises	Structural Model Equation	Financial capability, social responsibility	Value added intellectual coefficient	positive relationship
Smriti, Das, 2018 (India)	710 listed companies	dynamic system generalized method of moments estimator	Financial performance, Sales growth	Value added intellectual coefficient	positive relationship
Kai Wah Chu et al., 2011 (China)	333 data records, listed companies	Ordinary Least Squares Model	Financial performance,	Value added intellectual coefficient	positive relationship
Bayraktaroglu et al., 2019 (Turkey)	400 Turkish manufacturing firms	Multiple regression analysis	Financial performance,	Modified intellectual capital efficiency	positive relationship
Tran, Vo et al., 2020 (Vietnam)	16 listed banks	Method of moments (GMM) estimator	Financial performance	efficiency of intellectual capital	indefinite result
Pal, Soriya, 2012 (India)	105 pharmaceutical and 102 textile sector	Ordinary Least Squares Model	Financial performance,	Value added intellectual coefficient	varied result
Hang Chan, 2009 (China)	Listed companies, Hong Kong Stock Exchange	Ordinary Least Squares Model	Market valuation, profitability, ROE, productivity	Value added intellectual coefficient	moderate association
Xu, Li, 2019 (China)	Listed 116 high-tech SMEs vs. 380 non-high-tech SMEs	Ordinary Least Squares Model	Financial performance, ROE, ROA,ATO	Value added intellectual coefficient	positive relationship
Dženopoljac et al., 2016 (Serbia)	13,989 ICT companies	Structural Model Equation	Financial performance	Value added intellectual coefficient	semi positive result
Al-Musali et al., 2016 (Gulf Cooperation Council)	Listed companies, banking sector	Ordinary Least Squares Model	Financial performance	Value added intellectual coefficient	positive relationship
Nirino et al., 2020 (Europe)	345 European listed firms	Ordinary Least Squares Model	Financial performance	Corporate social responsibility, intellectual capital- mediator	positive relationship
Soewarno, Tjahjadi 2020 (Indonesia)	114 data records, banking sector	Ordinary Least Squares Model	Financial performance	Modified intellectual capital efficiency	positive relationship
Chowdhury et al., 2019 (Bangladesh)	23 listed companies, pharmaceutical sector	Ordinary Least Squares Model	Financial performance (ROE,ROA, ATO)	Value added intellectual coefficient	positive relationship

Cont. table 2.

Poh et al., 2018 (Malaysia)	10 listed companies, banking sector	Ordinary Least Squares Model	Financial performance (ROE,ROA)	Value added intellectual coefficient	positive relationship
Smriti, 2018 (India)	121 listed companies, pharmaceutical sector	Ordinary Least Squares Model	Financial performance/ profitability	Value added intellectual coefficient,	varied result
Babajee et al., 2020 (Mauritius)	43 hotels	Dynamic panel data framework	Financial performance	Intellectual capital	positive relationship
Nawaz, Haniffa, 2017 (Asia, Europe and the Middle-East)	157 Islamic banks	Pearson's correlation	Financial performance	efficiency of intellectual capital	semipositive rsult
Izzo et al., 2021 (Italy)	10 Fin-tech	Parametric/ nonparametric regression	Profitability indicators (ROE, ROA)	efficiency of intellectual capital	positive relationship
Barpanda, Bontis, 2021 (India)	252 monetary financial institutions	structural equation modelling	financial and social performance	efficiency of intellectual capital	positive relationship
Dženopoljac et al., 2017 (Serbia)	100 listed Arab companies	Normality test, correlation matrix, multiple regression models	EBIT, ROE, ROA	efficiency of intellectual capital	indefinite result
Meles et al., 2016 (US)	5,749 commercial banks	Ordinary least-squares method	Financial performance	efficiency of intellectual capital	positive relationship
Smuda-Kocoń, 2019 (Poland)	Listed companies, banking sector	structural equation modelling	Financial performance	Value added intellectual coefficient, corporate governance	positive relationship
Stahle et al., 2011 (Finlandia)	125 listed financial companies	Ordinary least squares model	Market value, ROE, ROA	efficiency of intellectual capital	indefinite result
Cabrita, 2009 (Portugal)	53 banks	Partial least squares	Business performance	Human capital, structural capital, relational capital	positive relationship
Buallay et al., 2020 (Gulf Cooperation Council)	59 listed companies, banking sector	Ordinary least squares model	Financial performance, ROE, market performance	Value added intellectual coefficient	positive relationship
Garcia Castro, 2021 (Columbia)	Banking sector	Ordinary least squares model	Financial performance,	Value added intellectual coefficient	varied result

Source: own study. Note: Value added intellectual coefficient (VAIC) is the trademark of Ante Pulic of the Austrian Intellectual Capital Research Centre. Further details can be found at: www.vaic-on.net.

The research carried out confirmed the existence of a number of identified links in the literature between IC and various economic categories. The compilation of the results of the analysis undeniably demonstrates the enduring relevance of the research field. There is an emphasis on the leverage power of the IC especially in the financial sector. However, the question remains open as to whether banks actually accumulate a higher level of IC than organisations (companies) in other sectors or whether the special research interest in the

financial sector is a direct consequence of the limitations in the methods used for the valuation of IC.

The geographical and sectoral cross-section of the research conducted is an interesting issue. The vast majority of those research projects were initiated between the years 2000 and 2014, following the introduction and establishment in practice of the VAIC (value added intellectual coefficient) method, considered easy to use and authoritative in determining the effects of intellectual capital. VAIC has gained a broad recognition in Asian countries.

The studies generally included the companies obliged to publish their financial data, and for which it was possible to determine their market value, what is a necessary prerequisite for the application of VAIC.

The studies, that have confirmed the existence of a positive relationship between IC and company performance have, on one hand, highlighted the diversity of this capital within an apparently homogeneous industry. Josh's research may be a good example. It was conducted on a group of organisations belonging to the Australian financial sector. Many studies have repeatedly rejected the hypothesis of a link between Capital Employed Efficiency (CEE) and business performance of companies.

The Smriti's (2018) analysis indicates that the relationship between the performance of a company's intellectual capital and conventional performance indicators are varied. The findings suggest that the performance of a company's IC can explain profitability, but not productivity and market valuation.

In Taiwan, Shiu (2006) conducted a cross-sectional studies of 80 Taiwan listed technology companies. The study found a significant positive association between Value added intellectual coefficient (VAIC) and profitability as well as market valuation, but a negative association with productivity.

The to-date's research projects have been outlining the scope of research to be undertaken in the future and justify the need to launch and sustain a similar research activity in SME business analysis.

4. Discussion

The theoretical resolutions in the area of research on IC interdependence are but far from being unambiguous or explicit. First, the content analysis showed that some of the models, proposed in scientific reports, did not mention anything on the fulfilment of normality assumptions which would have enabled the use of structural equation modelling.

Second, the causal conclusions, derived from empirical studies, could be unreliable, due to the passage of time and delays in the analysis of results (e.g. the temporal scope of a study may encompass the years of 2006-2008, while the report from the study may be published in 2013).

It is also impossible to disagree with Stańczyk-Hugiet (2014, p. 47) that the separation of the researcher from the context of his or her research, limits the possibilities of probing the causal relationship and, consequently, disables a proper interpretation of the results. Fourth, despite the confirmation of a positive causal relationship in numerous literature studies, it is difficult to make any broader generalisations in this respect. As shown, the research carried out concerned the financial, high-tech or pharmaceutical sectors, in particular, the companies listed on the stock exchange and obliged to publish their financial data. The belief that an analogous causal relationship under all circumstances will occur in other sectors and in unlisted companies, would a highly questionable approach. It also raises the question about the nature of the relationship between the measures of intellectual capital and the measures of the economic and financial situation of small and medium-sized enterprises. This question remains, so far, unanswered for the lack of alternative methods to measure intellectual capital, adapted to the specificities of smaller organisations.

Rokita clearly points out that, nowadays, companies operate in a chaotic environment, facing the need to solve ambiguous, sudden problems, leaving little or no time for a cause-effect analysis (Rokita, 2009, p. 218), which is undoubtedly the case with IC management.

5. Summary

Model approaches to the causal relationships between intellectual capital and the financial performance of companies justify the need to develop a research on the intellectual capital across different industries. Neither theoretical reasoning nor empirical solutions, obtained thus far in this area, have been unambiguous in the manner we would expect. While the results of the research indicate that, irrespective of the affiliations to particular industrial sectors, a positive causal relationship may be observed between intellectual capital and the financial situation of companies, it is but difficult to make any broader generalisations, as the research underway focuses, first of all, on stock-listed companies in the financial sector, high-tech enterprises and entities in the pharmaceutical sector. A synthesis of the intellectual capital research output shows that changes in the research structure and in the operationalisation of variables result in differentiated outcomes. It may then be assumed that regional, national and sectoral circumstances are not without influence on the development of the relationships studied at companies of other industries as well.

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