Analysis of determinants influencing the level of intellectual capital disclosure: The case of FTSE 100 entities

Martin Kucera ⓘD, Dana Dvorakova ⓘD

Prague University of Economics and Business (Czech Republic)

xkucm47@vse.cz, ddvorak@vse.cz

Abstract

Purpose: The paper deals with the issue of intellectual capital (IC) and its disclosure in the financial statements and other parts of annual reports of FTSE 100 entities. The paper aims to identify the determinants that influence entities to reveal IC related information and to highlight the theoretical aspects behind such determinants, resulting in comprehensive findings. The results of the analysis can be used to understand what leads entities to make decisions in the field of non-financial disclosure and help in the development of the IC reporting framework.

Design/methodology: The research is devoted to the analysis of the relationship between the level of IC disclosures by companies and the analysed determinants – size, asset structure, profitability, industry and the factor of time. The dataset can be characterised as a panel data set containing 100 firms from the FTSE100 Index for the four most recent financial years (2018-2021). To produce a comprehensive set of results, descriptive statistics are used, followed by regression and correlation analysis. The random effect method is used as it has a higher predictive power than pooled OLS and fixed effect methods in analysing panel data.

Findings: Based on the results of the analysis, it was concluded that the profitability measured as ROA is not a key factor of intellectual capital disclosure in the annual reports of FTSE 100 companies. From the point of view of size, there exists a statistically significant relationship between total assets and all components of IC, respectively overall IC. The analysis also showed a statistically significant impact of the sector in which companies operate. Particularly, companies in the service sector report more information on human capital and companies in the high-tech sector report more information on structural capital. A significant effect of asset structure was found for structural capital but only taking into account the effect of goodwill, not through the effect of other intangible assets. Finally, the paper demonstrated a positive and significant effect of the time factor on the level of reporting of all IC components.

Originality/value: This paper focuses on the determinants influencing the level of IC reporting in a representative sample of entities from the highly active FTSE100 Index, which provides a very recent and specific data sample from a research perspective. The paper is based on determinants that are frequently reported in existing research, and it extends the scope by incorporating the effect of intangible assets and goodwill as variables representing the asset structure in addition to the effect of time. This paper presents statistically based results on the relationships between the determinants and IC but also between the different elements of IC (human capital, structural capital and relational capital), which provide insights into the structure of reported information on intellectual capital. This insight is

very substantial given that many studies ignore the characteristics of the different components of the IC as they may be affected by different determinants.

To cite this article:

1. Introduction

Intellectual capital (IC) can be described as an entity's knowledge-based asset, and it has gotten a lot of attention from academics around the world in recent decades (Maditinos, Chatzoudes, Tsairidis &Theriou, 2011). IC is also known as intangible knowledge that may be converted into profits by utilizing an entity's non-monetary resources. According to Matinfard and Khavari (2015), IC is essential to value creation, particularly when economies are dominated by knowledge-based entities that rely on the utilization of intangible assets rather than tangible assets to gain a competitive advantage. Feimianti and Aantadjaya (2014) and Poraghajan, Ramezani and Mohammadzadeh (2013) provide evidence that the level of IC forms a positive relationship with an entity's value measured as the share price. Studies have also confirmed its relationship with financial performance measured as profitability, revenue growth, return on equity (ROE), and return on assets (ROA).

While internal stakeholders may be aware of the entity's non-monetary assets, investors as external stakeholders may not have adequate information, leading to increased risk perception which can lead them to invest capital elsewhere. This could be attributable to an inability to evaluate organizations' performance and to underestimate their potential to increase future earnings. To avoid this, companies voluntarily provide relevant information about the IC, usually in the form of an annual report or other separate documents. IC disclosure can result in a more accurate estimation of companies' market capitalisation. As there is no mandatory regulatory framework for the IC disclosure, such disclosure is mostly voluntary and based on the entity and market specific characteristics. Numerous entities fail to produce annual statements that explain how their various forms of capital generate value in the short, medium, and long term (Whiting & Woodlock, 2011). Furthermore, traditional financial reporting has been heavily criticized in the current era due to historical data and the inability to reflect comprehensive annual statements that characterize IC and social capital. As a result, interest in IC data is increasing since it determines the true value of a company by revealing underlying relationships between various types of assets (Haji, 2015). There are currently significant developments in the area of disclosures by entities. Financial reporting regulation has shifted its attention away from financial reporting and toward non-financial reporting. Integrated Reporting and the EU Directive 2014/95/EU on the disclosure of non-financial information are two examples, as are the current International Accounting Standards Board (IASB)'s activities.

This paper focuses on the analysis of the key determinants which can affect the presentation of structural, relational, and human capital as parts of IC to stakeholders. A significant volume of research which analyses the key determinants can be found (Taliyang, Abdul Latif & Mustafa, 2011; Eddine, Abdullah, Hamid & Hossain., 2015; Kamath, 2017). These factors include the entity's size, profitability, age, capital structure, and ownership concentration, among others. Sudibyo and Basuki (2017) have revealed that large profit-generating entities are linked with a competitive advantage, and because of that, it is expected that they accumulate additional financial assets and resources, enabling them to disclose additional information. Al-Hamadeen and Suwaidan (2014) found that, in the context of Jordanian public entities, the entity's size and ownership concentration have a significant relationship with the level of IC disclosure. They noted that one can easily see that the bigger the size of the entity, the greater the scale of the operations will be, allowing the entity to own more capital that cannot be quantified in monetary terms, such as networking systems, customer relationships and satisfaction, or employee

loyalty. Additionally, because large entities are more exposed to public scrutiny because of increased attention from shareholders, government, and regulatory authorities, they are more likely to publish comprehensive information about their operations. In terms of profitability, the resource-based assumption implies that entities may produce economic value and develop profitability if they pursue growth possibilities that correspond to the resources they employ (Barney, 1991).

Therefore, this paper examines the determinants that motivate an entity to disclose information about intellectual capital. The results of the analysis can be used to understand what leads entities to make decisions in the field of non-financial disclosure. The purpose of this research study is to contribute to the current IC disclosure literature by observing and identifying the determinants that predict or explain IC-based information in the annual reports of FTSE100 entities. The FTSE 100 Index comprises the 100 companies with the largest market capitalisation whose shares are traded on the London Stock Exchange (Fernandes & Mergulhão, 2016), making the study highly relevant to its respective fields. The paper aims to not only identify the determinants that influence entities to reveal IC-related information but also to highlight the theoretical aspects behind such determinants, resulting in comprehensive findings.

2. Literature review

Numerous theoretical approaches contribute to the intellectual capital disclosure in today's accounting and reporting environment. Rahman, Sobhan and Islam (2020) conducted research on the significance of intellectual capital from an academic perspective. The authors found a connection between intellectual capital disclosure and agency and legitimacy theory. According to agency theory, the agency cost may exist as a result of conflicts of interest between the principle and the agent (Astuti, Fachrurrozie, Amal & Zahra, 2020). To reduce management conflicts between shareholders and managers, supporters of agency theory emphasize the significance of methods to evaluate corporate management's behaviour (Frankforter, Berman & Jones., 2000). Transparency is one of the approaches, as it is a major element of disclosure and can be used to monitor management conflict (Astuti et al., 2020). As a result, the researchers suggest that the extent to which information is voluntarily disclosed can forecast the relationship between a company's shareholders and management. Meanwhile, Rahman, Sobhan and Islam (2019) demonstrate the relationship between legitimacy and stakeholder theory. The first is premised on the assumption that entities behave within the limits and regulations of the society or industry in which they operate (Guthrie & Petty, 2000). As a result, the theory is regarded as a fundamental framework for justifying the need for voluntary disclosure by entities in order to establish or sustain legitimacy between their activities and the social expectations associated with those activities (Mobus, 2005). Based on this argument, entities have explicit and implicit social responsibilities to the communities in which they operate. Following this assumption, entities are motivated to disclose information about their intellectual capital for the benefit of society which will consequently also benefit the entities themselves (Rahman et al., 2019). Another recent study that addressed the topic under discussion (i.e., the determinants of intellectual capital disclosure) in terms of audit committee quality used the signalling theory perspective to enhance IC disclosure practice (Astuti et al., 2020). According to signalling theory, there is an information gap between management and shareholders, with the management having accurate information and the shareholders having incomplete or sometimes incorrect information. The theory assumes that management will provide investors with information when it naturally increases the value of the company (Spence, 1974). Following that logic, signalling theory serves as the basis for voluntary disclosures. Voluntary disclosure in this context refers to disclosing elements other than those required by accounting standards (Rahman et al., 2019). Signalling a long-term revenue stream to the market is a powerful incentive for entities to disclose information on IC, even if the method of disclosure differs by company (Astuti et al., 2020).

From the beginning, while IC was in its development, there were ongoing debates about its evaluation and disclosure models. For instance, the recent transformation to a knowledge-based economy caused entities to change their value creation focus away from material goods manufacturing toward developing intellectual capital (Holland, 2003). Thus, a significant amount of research has been devoted to determining the optimal technique for integrating intellectual capital into traditional financial reporting. To address the limitations inherent in the move from a financial accounting framework to an integrated reporting system capable of incorporating IC,

experts looked to a variety of indexes, industries, and organizations to develop new methods and models for IC reporting. Skandia Navigator, Intangible Assets Monitor, VAIC, and IC Index are some examples (Bontis, 2001). However, these models were too firm-specific and were unable to establish a path toward standardisation (Bontis, 2001). As a result, while IC disclosure has consistently been a source of interest, there are currently no particular rules or regulations governing the measurement and reporting of IC. Indeed, entities find it very difficult to quantify IC, making it difficult to include precise data into the traditional accounting reporting frameworks (Van der Meer-Kooistra & Zijlstra, 2001). As a result, the extent to which entities disclose information about intellectual capital components varies by economic environment and even across industries. For example, according to Abeysekera and Guthrie (2005), the proportion of human capital as a component of IC disclosure is 36% for Sri Lankan firms. In comparison, it is only 30% in Australia. Simultaneously, the structural capital proportion reported by Sri Lankan enterprises was 20%, which was significantly less than the 30% reported by Australian entities. In the United Kingdom, recent research by Duff (2018) revealed that reporting of intellectual capital differs significantly between entities. Human capital is one of the most frequently disclosed components of intellectual capital, while structural capital is the least frequently released component.

Various significant factors have influenced organizations' intentions to adopt IC disclosure. Ali (2018) classified these factors as community or jurisdiction-related determinants. These determinants can be, for example, the type of external financing sources, a system of taxes, political events, inflation, and representation by professional accounting authorities. According to Ali (2018), these community-related factors play a sizeable role in developing and implementing accounting concepts and standards. Since these driving factors vary per jurisdiction, it logically follows that accounting concepts and practices relating to IC disclosure will also vary. In terms of the UK's environmental situation, the region's legal and accounting systems are well-known to be strict, and as a result, entities that comprise the FTSE Index are heavily regulated. Ali (2018) noted that the amount of disclosed information about IC is dependent on its availability, comparability, reliability, and verifiability. Karamanou and Vafeas (2005) noted that a lack of knowledge has prompted managers to hide information, as a lack of information may indicate the manager's negative evaluation. Despite the difficulties associated in disclosing IC, the market has demonstrated numerous incentives for entities to disclose information about their employees' skills and other organizational structures over time. One of the main motivations for voluntary IC disclosure is to reduce information asymmetry between the organization and its stakeholders. For instance, Andriessen (2004) demonstrates that information asymmetry is most likely a result of capital misallocation, which gradually results in social costs such as increased unemployment or decreased production. Additionally, recent studies such as Martini, Corvino, Doni and Rigolini (2016) have examined information asymmetry to identify elements that may increase IC disclosure. Additionally, the shortcomings of traditional financial accounting create a disadvantage for the average investor, who is only exposed to the annual statements, compared to informed insiders. It could result in the risk of higher insider trading for the company according to Leadbeater and London (1999) or Vergauwen and Van Alem (2005). As a result, reducing information asymmetry may result in a number of benefits for the entity and its stakeholders. Farooq and Nielsen (2014) also provide evidence that IC disclosure may be able to minimize the advantages of internal stakeholder by reducing information asymmetry. Additionally, one of the benefits is lower capital costs. Bontis (2001), Andriessen (2004), Vergauwen and Van Alem (2005) all contribute to a better understanding of this phenomenon. They explain that when stakeholder perceptions of firm risk improve, borrowing costs will decrease, which leads to attracting a broader number of investors. It can be said that the greater the level of disclosure is, the more favourable the company's evaluation and belief in its ability to generate future profit will be. It is most likely to result in future increases in share prices and market capitalisation (Williams, 2001). A similar finding was revealed in Arifin (2017), in which the firm's book value or market to book ratio (MV/BV)was found to be a major predictor of intellectual capital disclosure in Indonesia's banking sector. Thus, according to the literature, market value or market share is one of the predictors of IC disclosure (Marisanti & Kiswara, 2012; Hatane, Wijaya, William & Haryanto, 2018). Other specific determinants include, for example, the firm's size, leverage, profitability, and the type of industry.

Ali (2018) demonstrated a significant relationship between the size of the company and the degree of disclosure in the financial statements. White, Lee, Yuningsih, Nielsen and Bukh (2010) and Ferreira, Branco and Moreira

(2012) have also argued for the same, implying that firm size is a significant driver of IC disclosure. The results of the discussed analyses suggest that large entities have more financial resources and internal relations than small and micro entities. Thus, large entities are more able to sustain or absorb the expenses of information disclosure on IC. It should also be noted that there are published studies that have failed to demonstrate this relationship (Dey & Faruq, 2019; Rambe, Dewi, Muda & Ginting, 2020). Forte, Tucker, Matonti and Nicolò (2017) even found an inverse relationship between company size and level of IC disclosure.

Based on these findings, the first hypothesis was established to help evaluate the relationship between firm size and the level of IC reporting for a data sample that considers the largest companies from a highly regulated environment.

> *H1: Larger entities (measured by total assets) have a higher level of IC disclosure.*

However, the above cited studies did not address the structure of the assets, which should also be considered, as the type of assets held may affect the level of information reported on IC. According to signalling theory, companies that are more dependent on intangible assets are more motivated to disclose information about their intellectual capital, especially because most of these investments are not recognised by international accounting standards (see IAS38) in financial statements. Schiemann, Richter and Günther (2015) found that the magnitude of recognised intangible assets is significantly and negatively associated with the quantity and quality of voluntary IC disclosure. Based on this finding, it can be determined that a higher magnitude of recognised intangible assets on the balance sheet reduces the level of voluntary IC disclosure. This conclusion is not consistent with signalling theory. From a financial reporting perspective, intangible assets are represented on the balance sheet by two components, namely goodwill and other intangible assets. Although goodwill and other intangible assets are characterised as having no physical substance, it is appropriate to distinguish them from each other. Kateb (2014) found that the level of reported goodwill positively affects the level of IC reporting, but the relationship between the level of other intangible assets and the level of IC reporting was not demonstrated. Asset structure and its impact on IC reporting has not been studied extensively until the moment and is therefore a very topical issue.

Based on these findings the second hypotheses were set:

> *H2a: Entities with a higher proportion of intangible assets (measured as intangibles to assets ratio)have a higher level of IC disclosure.*

> *H2b: Entities with a higher proportion of goodwill (measured as goodwill to assets ratio) have a higher level of IC disclosure.*

Additionally, profitability, or more precisely, ROA, has played a significant role in influencing IC disclosure in the case of Thailand entities (Hatane et al., 2018). The author used signaling theory to explain the relationship between a company's profitability and its IC disclosure. Hatane et al. (2018) explain that a company's higher profit signals investors that it performs effectively by providing detailed information on its components of intellectual capital. Hatane et al. (2018) findings are also consistent with previous research by Ousama, Fatima and Hafiz-Majdi (2012). Ousama et al. (2012) conducted a study of Malaysian organizations and concluded that firms with a greater profit margin tend to motivate managers to disclose information about IC to obtain a higher managerial bonus. Thus, increased profitability motivates continuous investment in IC disclosure, with firms disclosing the components of IC in more detail to demonstrate the quality of their long-term investment decisions and the firm's value. With regards to the UK region, Mangena, Pike and Li (2016) discovered that ROA has a substantial link to IC disclosure in FTSE 100 listed corporations. On the other hand, Williams (2001) found that the performance of UK firms is not a determinant of voluntary IC disclosure.

Based on the research already conducted, a third hypothesis was established to evaluate the impact of the second major factor that financial statements provide in addition to size.

> *H3: Entities with higher profitability (measured by ROA) have a higher level of IC disclosures.*

According to Ousama and Fatima (2010), the type of industry can influence the extent of IC disclosure. They argue that entities operating in high-profile sectors are more likely to disclose information about IC because they confront increased consumer visibility, dynamic competition, and political risk compared to entities operating in low-profile industries. On the other hand, other studies have not found the type of industry to be a significant determinant of IC disclosure (De Silva, Stratford & Clark, 2014; Branco, Delgado, Sá & Sousa, 2010). The inconsistent conclusions may be attributable to the different sectoral breakdowns and the limited data sample in the studies conducted. Therefore, this paper also examines the influence of the sector in which companies operate, as businesses in different industries are dependent on different variables, whereby the influence of alternative industries on different components of IC can be assumed.

Based on these arguments, the fourth hypothesis was set:

H4: The entity industry affects the degree of IC disclosures.

The last hypothesis aims to evaluate the time effect, i.e., whether the reporting level of IC information increases or decreases over time. Branco et. al. (2010) attempted to evaluate this effect, but failed to demonstrate a relationship between time and reported IC information. However, earlier studies found that companies show an increased level of disclosure information about IC in their annual reports over time (Abeysekera & Guthrie, 2005; Petty & Cuganesan, 2005). The specific time period analysed in our paper may have a significant impact on the results of the analyses, as there has been a significant increase of non-financial reporting in the current period. In recent years, the development of non-financial reporting has been significantly influenced by emerging standardisation, including Directive 2014/95/EU on the disclosure of non-financial information in European Union, or International Integrated Reporting Council (IIRC) framework and Global Reporting Initiative (GRI) standards, which are applied globally. The EU regulation has even reached the stage of developing a single taxonomy that will provide businesses and financial investors with uniform criteria for identifying economic activities that are considered environmentally sustainable (see Directive 2020/852/EU).

Another milestone is the establishment of the International Sustainability Standards Board (ISSB) within the IFRS Foundation, which aims to develop IFRS standards for non-financial reporting. EFRAG's activities also address the issue of appropriate reporting of information about intangible assets, where conclusions can significantly affect the reporting of financial and non-financial information about intangible assets globally. Terblanche and De Villiers (2019) analysed whether integrated reports (IR) are associated with greater IC disclosure. The study found that companies producing integrated reports disclose more IC information, specifically human resources information. The study highlights the correlation between IR and IC disclosures, particularly in relation to human capital information, and raises questions as to why IR has not affected the extent of disclosure of relational and structural capital information. Beretta, Demartini and Trucco (2019) examined the attributes of IC disclosure in integrated reports published by European listed firms between 2011 and 2016. The authors found that IC disclosures in integrated reports are positively oriented and backward-looking. The IC does not compete with the IIRC, GRI or financial reporting regulators such as the IASB. In fact, IC forms an essential part of the reporting under each of these reporting frameworks (De Villiers & Sharma, 2020). However, this fragmentation of IC information may lead to a hidden value and increase information asymmetry. In this context, it is worth mentioning that the sample analysed includes years that were affected by the COVID-19 pandemic, which may also affect the level of information reported.

The last hypothesis seeks to evaluate the effect of time and the possible effect of the COVID-19 pandemic.

H5: The level of IC disclosure increases over time.

In this paper, the factors of size, assets structure, profitability, industry and time are analysed as determinants of IC disclosure, as these are factors that can be ascertained from companies' annual reports. Each of the hypotheses is evaluated separately for human capital (HC), structural capital (SC), relational capital (RC), and overall intellectual capital (IC), in order to find a statistically significant relationship with intellectual capital reporting.
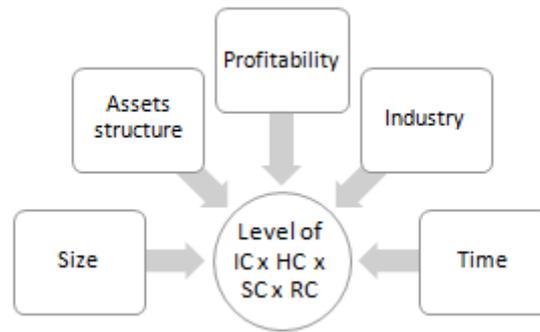
Figure 1. Determinants of the level of IC information reporting

The hypotheses presented here are based on existing research and are intended to provide an up-to-date perspective on the predictive power of these determinants on the level of IC information reporting. The analysis is conducted on a broad sample of companies from a market environment that is highly active and competitive, which puts pressure on companies' transparency. Additionally, it is a dataset that has not been examined yet. A significant added value of the research is that the analysis is not only conducted from the perspective of the overall IC but also of all its components, which provides insight into the structure of the reported IC information.

3. Methodology

The hypotheses are evaluated using data from the FTSE 100 stock index as of 31 December 2021, which represents the 100 largest companies traded on the London Stock Exchange. The dataset contains annual reports for the most recent four-year period (2018-2021). This data sample was selected because these are the companies that are subject to the same regulations and public pressure to report information in their annual reports. It is also one of the most active and competitive markets. Companies are categorised into different industries (traditional industry, high-tech industry and services) according to the methodology of Zéghal and Maaloul (2010). The categorization is based on the methodology of the UK Department of Trade and Industry, which provides an approach to classify the 39 sectors of the economy into three categories to determine the level of value added by entities.

Intellectual capital tends to be captured in annual reports in various ways, mostly through non-financial reporting. This practice complicates quantitative data analysis in the field. Since IC are largely non-monetary items that cannot be easily converted to numerical values, studies such as Mehrotra, Malhotra and Chauhan (2017) and Morariu (2014) discuss various categories of IC disclosures, which are typically classified as human, structural, and relational capital. However, our research does not take a qualitative approach to analysing IC information. In this paper, the quantitative data are prepared using text analysis, using a glossary of terms that was first created to characterize each part of intellectual capital (see Appendix 1). The glossary of terms was prepared on the basis of previously conducted research (Bellucci, Marzi, Orlando & Ciampi 2021; Dabić, Vlačić, Scuotto & Warkentin, 2021; Quintero-Quintero, Blanco-Ariza & Garzón-Castrillón, 2021) and also by qualitative analysis of a random sample of 40 annual reports, which aimed to reveal the terminology used by entities to describe the components of IC. The level of reporting of IC information is characterized by the volume of occurrences of those terms in companies' annual reports.

The determinants can be considered independent factors, whereas the levels of IC disclosures and their components in entities' annual reports are dependent variables. The research includes six main independent variables, where the companies' industry of is measured as a dummy variable. The other five independent variables are firm size (measured as total assets),profitability (measured as return on assets), asset structure(intangibles to assets ratio, goodwill to assets ratio) and a factor of time (years). An overview of all variables can be found in Table 1.

Variable	Type of variable	Characteristics
Intellectual capital	Dependent	Sum of occurrences of the terms characterizing all IC components.
Human capital	Dependent	Sum of occurrences of the terms characterizing human capital.
Structural capital	Dependent	Sum of occurrences of the terms characterizing structural capital.
Relational capital	Dependent	Sum of occurrences of the terms characterizing relational capital.
Size	Independent	Total assets held by a company.
Profitability	Independent	Net income received after tax divided by total assets held, also known as return on assets (ROA).
Type of Industry	Independent	Dummy variable (traditional sector, services, high-tech sector)
Time factor	Independent	Years of annual reports analysed:2018, 2019, 2020 and 2021.
Intangible ratio	Independent	Intangibles to total assets ratio
Goodwill ratio	Independent	Goodwill to total assets ratio

Table 1. Description of all variables

In the context of this article, the terms total assets, intangibles, goodwill and return on assets are measured in relation to their values as recorded in the financial statements of the companies from the years2018 to 2021. Intangibles are defined according to the definition in the Standard IAS 38 *Intangible assets* as an identifiable non-monetary asset without physical substance. For an item to be recognised as an intangible asset according to the Standard IAS38, it must necessarily meet these characteristics – identifiability, control of the asset by the entity, and the inflow of future economic benefits (IASB, 2004). The definition of goodwill can be found in IFRS 3 *Business combinations* as follows - an asset that is expected to contribute future economic benefits arising from other assets acquired in a business combination that cannot be individually identified and recognised separately. Goodwill from a business combination is recognised as an asset and represents the excess of the cost of the business combination over the acquirer's share of the net fair value of the acquiree's identifiable assets, liabilities and contingent liabilities. Thus, goodwill is the residual of the cost of the business combination after recognising the identifiable components of the acquiree's net assets (Wiley, 2021).

The components of intellectual capital, such as human capital, structural capital, relational capital, and overall IC, have been characterized by the frequency at which the selected terms appear in annual reports (see Appendix 1). The period 2018 - 2021 was chosen to ensure use of the most recent dataset and to discover the potential impact of the COVID 19 pandemic, which could have impacted company performance in 2020 and 2021.

To produce a comprehensive set of results, descriptive statistics are used, followed by regression and correlation analysis. A similar design of research was used in the research of Mangena, Li and Pike (2012), which useda correlational design to evaluate whether the audit committee attributes impacted IC disclosures among UK listed companies. While descriptive statistics enable simple description and comparison of variables, the other two statistical methods are rather complex. Correlational analysis was used to determine the strength of the relationship or connection between chosen variables - in this case, firm-specific factors and IC disclosure items. Regression analysis, on the other hand, is used to determine the relative strength of observed relationships between independent and dependent variables. To determine the optimal method for evaluating panel data for all regression models, the Lagrange multiplier test, the F test for individual effects, and the Hausman test were used. According to the statistical tests conducted, the random effects method approach has a greater predictive potential than the pooled OLS and fixed effects methods. The random effects model is also more appropriate based on the type of independent variables, where the type of industry is characterized by a dummy variable. According to the Breusch-Pagan test results, the heteroscedasticity of the examined models is not statistically significant.

4. Analysis and discussion

The following section of the paper summarizes the statistical data to address the research problem, covering descriptive statistics, Pearson correlation analysis, and multilinear regression. Additionally, the section discusses the findings from previous research in order to provide a comprehensive view on FTSE 100 companies. To clarify the sample size in relation to the companies included in the FTSE 100 for the current analysis, the following table specifies the industries in which these companies operate. According to the structure of sectors,

it can be suggested that the selected companies represent a wide range of sectors (Appendix 2), which were gathered into three industry categories.

Industry	Number of entities	Percentage
Services	50	50%
High-tech industry	11	11%
Traditional industry	39	39%
Total	**100**	**100%**

Table 2. Industry characteristics

The overall sample size is 400, as data from 100 companies were collected over a four-year period. Consequently, out of the 100 companies, most are selected from the services industry (i.e., 50 companies), following the traditional industry (i.e., 39 companies). The least number of companies represented are from the high-tech industry (i.e., 11 companies).

According to descriptive statistics, the average number of times structural capital was mentioned in various terms or phrases over a four-year period was 1,336; relational capital was 1,178; and human capital was 950. Because the IC factor incorporates all intellectual capital variables, it is critical to note that its mean accounts for 3,469 term occurrences over the four-year period. Return on assets (ROA) has been positive on average for the 100 enterprises over the selected time with a value of 7%. In terms of total assets, there is a significant variance between the companies analysed, with the smallest asset value being 63.7 million pounds, while the highest asset value was 2,191,065.9 million. By examining averages by industry, it is possible to conclude that IC has the greatest average of 3,493 words in the services industry. This indicates that, on average, companies revealed more IC in the services industry than companies in the other industries, but it is also worth noting that the difference in the average value is not very noticeable. The same can be said about relational capital as part of IC, which also has the highest value on average in the services industry. On the other hand, the average level of reported information on human capital is highest in the traditional sector and the average volume of reported information on structural capital is highest in the high-tech industry. Both the intangible to assets ratio and goodwill to assets ratio are highest in the high-tech sector, indicating that companies in this industry use a higher ratio of intangible assets than companies in other sectors.

Industry	Variable	N	Min	Max	Mean	Std. Dev.
High-tech	Total assets (£ million)	44	63.72	80431.00	21748.35	26684.72
	ROA	44	-0.21	0.68	0.08	0.12
	Human capital	44	438.00	1550.00	927.90	298.83
	Structural capital	44	514.00	3123.00	1502.1	626.48
	Relational capital	44	272.00	1590.00	891.20	279.44
	IC	44	1537.00	6273.00	3330.00	1167.66
	Intangibles ratio	44	0.00	0.47	0.20	0.14
	Goodwillratio	44	0.00	0.59	0.22	0.18
Services	Total assets (£ million)	200	400.7	2191065.90	183109.5	396122.2
	ROA	200	-0.08	0.43	0.06	0.08
	Human capital	200	71.00	2207.00	931.4	386.32
	Structural capital	200	163.00	3165.00	1329.4	562.85
	Relational capital	200	65.00	3084.00	1229.00	574.77
	IC	200	299.00	8126.00	3493.00	1408.11
	Intangibles ratio	200	0.00	0.37	0.07	0.09
	Goodwill ratio	200	0.00	0.80	0.16	0.20
Traditional	Total assets (£ million)	156	1350.00	222186.00	29904.00	42863.53
	ROA	156	-0.11	0.30	0.07	0.06
	Human capital	156	293.00	2581.00	978.90	377,56
	Structural capital	156	349.00	3462.00	1306.3	500.40
	Relational capital	156	387.00	3073.00	1182.7	405,68
	IC	156	1029.00	9123.00	3471.00	1207.48
	Intangibles ratio	156	0.00	0.56	0.07	0.13
	Goodwill ratio	156	0.00	0.45	0.10	0.11

Industry	Variable	N	Min	Max	Mean	Std. Dev.
Total	Total assets (£ million)	400	63.70	2191065.90	106540.3	293059.2
	ROA	400	-0.21	0.68	0.07	0.08
	Human capital	400	71.00	2581.00	950.1	375.24
	Structural capital	400	163.00	3462.00	1336.00	546.50
	Relational capital	400	65.00	3084.00	1178.4	498.40
	IC	400	299.00	9123.00	3469.00	1306.97
	Intangibles ratio	400	0.04	0.56	0.08	0.12
	Goodwill ratio	400	0.01	0.80	0.13	0.17

Table 3. Descriptive statistics

Given that the primary objective of the study is to evaluate the determinants of intellectual capital disclosure, the Pearson Correlation is used to determine whether total assets (firm size),return on assets (profitability) and structure of assets (intangibles to assets ratio, goodwill to assets ratio)as continuous variables are associated with the items of human capital, structural capital, relational capital, or the overall IC in the annual reports of the 100 companies.

	Total assets	ROA	HC	SC	RC	IC	GW ratio	Intangi. ratio
Total assets	1	-0.26	0.29	0.34	0.49	0.39	-0.24	-0.18
ROA	-0.26	1	-0.21	-0.29	-0.22	-0.2	0.1	-0.12
HC	0.29	-0.21	1	0.79	0.72	0.89	-0.15	0.03
SC	0.34	-0.29	0.79	1	0.78	0.94	-0.33	0.01
RC	0.49	-0.22	0.72	0.78	1	0.92	-0.21	0.08
IC	0.39	-0.2	0.89	0.94	0.92	1	-0.17	0.05
GW ratio	-0.24	0.1	-0.15	-0.33	-0.21	-0.17	1	0.52
Intang. ratio	-0.18	-0.12	0.03	0.01	0.08	0.05	0.52	1

Table 4. Correlation matrix of dependent and independent variables

The correlation results indicate an association between company size and relational capital. The link is shown by a coefficient value of 0.49, indicating that it is positive in direction and strong in intensity. A positive relationship is also evident for human capital, structural capital, and consequently for total intellectual capital, but the strength of the relationship is lower. In terms of ROA, it can be suggested that the variable has a rather weak and negative relationship with all parts of IC. A high correlation is evident between the IC value and human capital, structural capital, and relational capital, which is logical since IC is the sum of these values. An interesting relationship is the association between the level of information on human capital and structural and relational capital. This level indicates that if companies have already considered one area of intellectual capital, they have also considered the other elements. The values between the goodwill to assets ratio and the components of intellectual capital indicate a very low level and a negative relationship, except for structural capital, where a higher level of relationship can be observed. A weak link is also evident between all components of intellectual capital and the intangibles to assets ratio.

The random effects method is used to identify the impact of ROA (profitability), total assets (firm size), intangibles to assets ratio and goodwill to assets ratio on the disclosure of IC factors (human capital, structural capital, and relational capital), and respectively total IC in the annual reports of the 100 firms across four years. Additionally, as noted in the methodology section, the study also uses industry type and time factor as potential determinants (independent variables).

The model in Table 5 examines the relationship between the set of determinants and the dependent variable, human capital disclosure. The R-squared result indicates that the model adequately explains almost 45 percent of the dependent variable's variance. Individually, total assets significantly impact the disclosure of human capital at the 0.05 level. The effect of this variable is positive, i.e., the higher the number of total assets entities have, the more they report information on human capital. Industry type also has a statistically significant and positive effect on the level of reporting of human capital information. Specifically, services as the type of industry is correlated with the level of human capital information reporting at the 0.05 level. This relationship can be

explained by the dependence of the services sector on human labour and human capital, which leads to increased reporting. The last independent variable that has a statistically significant effect on the reporting of human capital is the time factor. Based on the 4-year period analysis, it can be inferred that the most recent the annual report, the higher the amount of human capital information it contains. From this influence, it can be assumed that the volume of information will continue to increase over time.

Human Capital = Total Assets + ROA + High-tech + Services+ GW ratio+ Intangibles ratio + factor (Year)				
Coefficients	Estimate	Std Error	z value	Pr (>|z|)
(Intercept)	7.9467e+02	5.8090e+01	3.6801	< 2.2e-16 ***
Total Assets	1.0538e-04	1.0947e-04	0.9626	0.0357 *
ROA	-2.2706e+02	2.1228e+02	-1.0696	0.2848
High-tech	-3.5340e+01	1.1509e+02	-0.3071	0.7588
Services	5.3248e+02	6.8774e+02	0.7742	0.0388 *
Goodwill ratio	-2.2410e+02	1.7292e+02	-1.2960	0.1950
Intangibles ratio	1.1306e+02	2.2649e+02	0.4992	0.6177
Year 2019	1.3441e+02	2.6161e+01	5.1376	2.782e-07 ***
Year 2020	3.1090e+02	2.6452e+01	3.7533	1.631e-04 ***
Year 2021	3.9849e+02	2.6683e+01	4.9342	< 2.2e-16 ***
Signif. levels:	0.000	0.001 ***	0.01 **	0.05 *
Multiple R-squared:	0.44539	Adjusted R-squared:	0.4319	
		p-value:	< 2.22e-16	

Table 5. Output of regression analysis – Human capital

The next multiple regression model examines the impact of the same predictors on the extent of the disclosure of structural capital in annual reports. The R-squared value suggests that the model explains a variance of 57.34% in the dependent variable, structural capital. If observed individually, the outcome of the regression indicates that the impact of total assets is statistically significant. Similar to human capital, a significant influence of the time factor can be observed for the relationship with structural capital, which also positively influences the level of reporting. The statistically significant effect of the goodwill to assets ratio should also be noted. This effect can be defined as having a negative direction. The relationship shows that the greater the proportion of goodwill to assets the company reports, the less structural capital information is reported by the company.

Structural Capital = Total Assets + ROA + High-tech + Services + GW ratio + Intangibles ratio + factor (Year)				
Coefficients	Estimate	Std Error	z value	Pr (>|z|)
(Intercept)	9.1561e+02	7.4851e+01	4.2324	< 2.2e-16 ***
Total Assets	5.7050e-04	1.4103e-04	4.0452	5.228e-05 ***
ROA	-2.0600e+02	2.7379e+02	-0.7524	0.4518
High-tech	2.1074e+02	1.4826e+02	1.4214	0.1552
Services	-5.4922e+01	8.8593e+01	-0.6199	0.5353
Goodwill ratio	-2.0123e+02	2.2289e+02	-0.9028	0.0466 *
Intangibles ratio	1.2519e+02	2.9202e+02	0.4287	0.6681
Year 2019	3.7445e+02	3.3750e+01	4.0947	0.0004932 ***
Year 2020	5.3335e+02	3.4126e+01	5.6288	< 2.2e-16 ***
Year 2021	6.8764e+02	3.4423e+01	6.9765	0.731e-04 ***
Signif. levels:	0.000	0.001 ***	0.01 **	0.05 *
Multiple R-squared:	0.5734	Adjusted R-squared:	0.56302	
		p-value:	< 2.22e-16	

Table 6. Output of regression analysis – Structural capital

The third regression model (Table 7) uses relational capital as the dependent variable and the same predictors as previous models. The R-squared value is measured to be 0.4894, showing that 48.94% of variance is explained. The total assets value, as the high-tech industry and factor of time, are statistically significant. All these independent variables influence the dependent variable, relational capital, in a positive direction. There is also an interesting effect of the high-tech industry on relational capital reporting. In general, it can be established that the high-tech sector is associated with activities and characteristics that often cannot be fully captured from the

perspective of traditional financial reporting. Based on the analysis conducted, it can be argued that companies in the high-tech sector put more emphasis on reporting relational information than companies in other sectors.

Relational Capital = Total Assets + ROA + High-tech + Services + GW ratio + Intangibles ratio + factor (Year)				
Coefficients	Estimate	Std Error	z value	Pr (>|z|)
(Intercept)	9.5386e+02	6.5447e+01	4.5746	< 2.2e-16 ***
Total Assets	7.1029e-04	1.2233e-04	5.8063	6.385e-09 ***
ROA	-2.2722e+02	2.4927e+02	-0.9116	0.3620
High-tech	2.7959e+02	1.2803e+02	2.1837	0.0289 *
Services	-4.8105e+01	7.6461e+01	-0.6291	0.5292
Goodwill ratio	-2.8484e+02	1.9741e+02	-1.4429	0.1490
Intangibles ratio	2.3705e+02	2.6157e+02	0.9063	0.3648
Year 2019	1.1584e+02	3.1095e+01	3.7252	0.0001952 ***
Year 2020	3.5073e+02	3.1424e+01	3.1613	< 2.2e-16 ***
Year 2021	4.7100e+02	3.1669e+01	4.8725	< 2.2e-16 ***
Signif. levels:	0.000	0.001 ***	0.01 **	0.05 *
Multiple R-squared:	0.4894	Adjusted R-squared:	0.47698	
		p-value:	< 2.22e-16	

Table 7. Output of regression analysis – Relational capital

Finally, the last regression model uses the overall IC as the dependent variable. The R-squared value is measured to be 0.54, showing a 54% explained variance. The regression table shows that the total assets value is statistically significant. The total assets value has a positive correlation with the disclosure of IC, which is the same effect as in all previous models. The time factor also has a significant and positive effect for all analysed years.

Intellectual Capital = Total Assets + ROA + High-tech + Services + GW ratio + Intangibles ratio + factor (Year)				
Coefficients	Estimate	Std Error	z value	Pr (>|z|)
(Intercept)	2.6676e+03	1.7876e+02	4.9226	< 2.2e-16 ***
Total Assets	1.4069e-03	3.3448e-04	4.2061	2.598e-05 ***
ROA	-7.1070e+02	6.7754e+02	-1.0490	0.2942
High-tech	1.0298e+02	3.5026e+02	-0.2940	0.1688
Services	-1.5989e+02	2.0919e+02	-0.7643	0.2447
Goodwill ratio	-7.0655e+02	5.3842e+02	-1.3123	0.1894
Intangibles ratio	5.1221e+02	7.1242e+02	0.7190	0.4722
Year 2019	6.2400e+02	8.4389e+01	3.3943	1.422e-13 ***
Year 2020	1.1942e+03	8.5288e+01	4.0025	< 2.2e-16 ***
Year 2021	1.5575e+03	8.5962e+01	5.1180	< 2.2e-16 ***
Signif. levels:	0.000	0.001 ***	0.01 **	0.05 *
Multiple R-squared:	0.53995	Adjusted R-squared:	0.52876	
		p-value:	< 2.22e-16	

Table 8. Output of regression analysis – Overall intellectual capital

Within the framework of the conducted analyses, it is possible to test the established hypotheses. Hypothesis 1 - *Larger entities (measured with total assets) have a higher level of IC disclosures* is confirmed for overall intellectual capital disclosure and for all parts of intellectual capital, namely human capital, structural capital and relational capital. Based on the outputs of the regression analysis, it can be determined that the larger a company is in terms of total assets, the more it focuses on reporting all components of intellectual capital. The conclusion of this analysis is consistent with previous research which demonstrated a positive relationship between size and the level of IC disclosure (Al-Hamadeen & Suwaidan, 2014; Sudibyo & Basuki, 2017) and provides arguments to support this relationship based on very recent data. According to the authors of this paper, the positive dependence is logical, as larger companies are under more pressure from stakeholders and have more resources, but it should be emphasized that the hypothesis was accepted for a sample of companies that are among the largest in the market and are subject to very similar pressures on disclosure. The contribution of the analysis conducted is also in the use of a dataset that focuses on very similar and large companies, as some previous

studies have used samples of companies that varied widely in size. On the other hand, the conclusion is not consistent with the findings of Forte et al. (2017), who found a negative relationship.

This paper also aimed to assess the impact of asset structure, specifically focusing on intangible assets and goodwill, i.e., parts of assets that are often very closely related to the components of intellectual capital. The analyses performed failed to prove Hypothesis 2a - *Entities with a higher proportion of intangible assets (measured as intangibles to assets ratio) have a higher level of IC disclosure* and Hypothesis 2b- *Entities with a higher proportion of goodwill (measured as goodwill to assets ratio) have a higher level of IC disclosure* for all components of IC and for overall IC. On the contrary, in terms of structural capital, a statistically significant negative relationship between the intensity of goodwill and the level of disclosure was found. This conclusion is partly in line with Kateb (2014) who also failed to find a relationship between the level of intangible assets and the level of IC reporting. However, he was able to show a positive relationship between the level of goodwill and the level of IC reporting. The conclusion of our paper shows a negative relationship for structural capital and goodwill, exactly the opposite of Kateb (2014). Schiemann et al. (2015) explain as a justification for this dependency that the reporting of an intangible asset or goodwill on a company's balance sheet itself provides information about the existence of a possible intellectual capital component. It can therefore be established that the greater the proportion of a company's assets that is made up of goodwill, the company reports less information on structural capital.

Hypothesis 3 - *Entities with higher profitability (measured with ROA) have a higher level of IC disclosures* cannot be confirmed or denied for all parts of the IC and, consequently, for the overall IC. This finding supports Williams (2001), who found that the performance of UK firms is not a determinant of voluntary IC disclosure. In contrast, it does not support the conclusions of other mentioned papers. For example, a recent study by Hatane et al. (2018) found that higher profitability signals better disclosure of intellectual capital in firms' annual reports. This was also consistent with the conventional studies of Ousama et al. (2012) and Mangena et al. (2012), who analysed the FTSE 100 firms and found that profitability and ROA had a significant relationship with IC disclosure. The reason the hypothesis was not supported may be the focus of the research on all companies in the FTSE100, where the industry category is only one of the explanatory variables. A regression analysis for individual industries might provide different conclusions.

In terms of Hypothesis 4 - *The entity industry affects the degree of IC disclosures*, there is a statistically significant relationship between the selected industries from the analysed sample and the level of IC disclosure. The hypothesis can be confirmed for human and relational capital, which partly confirms the findings of Ousama and Fatima (2010). On the other hand, it cannot be confirmed for the model with overall IC and structural capital as the dependent variable. According to the analysis, the services industry has a positive effect on human capital and the high-tech industry has a positive effect on relational capital. These findings help to confirm the assumption that the services sector, which is often dependent on a high volume of staff, is more concerned with reporting this component of IC. Unlike the traditional sector, which is characterised using tangible assets, the services sector depends on aspects not included in the balance sheet. This conclusion can be supported by the fact that in the sample analysed, companies in the services industry have the largest average number of employees. The authors of the paper compared the average number of employees for defined industries. Companies in the traditional sector have an average of 41,000 employees, the high-tech sector 37,000 employees, and the services sector 44,000 employees. The number of employees was considered as a determinant, but no association was found, and therefore it was not further analysed in this paper. Relatedly, the high-tech industry, which is often represented by young and dynamic companies, focuses on reporting relational capital, as these companies may not yet have established long-term relationships with their environment, and it is this part of the business that they focus on.

The last Hypothesis 5 - *The level of IC disclosure increases over time* can be confirmed for each part of IC and consequently for overall IC. In the analyses conducted, a significant effect of all years examined was confirmed and it can therefore be established that the most recent the annual report, the more information on IC it contains. On the other hand, annual reports from the years 2018-2021 were used for the analysis, which are significantly affected by the company's emphasis on reporting non-financial information. For example, Directive 2014/95/EU on the disclosure of non-financial and diversity-related information by certain large companies and

group became effective from 1 January 2017. The Directive establishes an obligation for selected entities to disclose information relating to environmental, social and employment issues, respect for human rights, the fight against corruption, and the diversity of corporate bodies in their annual reports. A second example of current developments in reporting can be the approach of integrated reporting. Non-financial reporting is a very current and novel topic, and it is logical that its implementation in companies' annual reports has been progressively adopted in recent years. The findings of this paper confirm the conclusions in existing research (Abeysekera & Guthrie, 2005; Petty & Cuganesan, 2005). Moreover, the negative impact of the COVID-19 pandemic on reporting has not been evident, as even in the years when the virus affected companies in Europe (i.e., 2020 and 2021) the volume of information reported increased significantly. This may be because the companies analysed were not fundamentally affected economically by the pandemic, as they were able to transform themselves in terms of working constraints. The transformation that has taken place in companies in general can be characterised as a shift from human capital to structural capital, where a number of processes have changed, and digitalisation has taken hold to an increased extent. Following this, when something happens in companies that helps optimise profits, companies are motivated to disclose more information about it.

5. Conclusion

It has been demonstrated that IC stands as the core of a business. It is especially relevant in today's modern era when technology and innovation have been at the forefront of businesses and, IC has become the deciding factor in whether a company succeeds or fails. The measurement and inclusion of IC in a company's non-financial component have become critical, but no framework for such reporting exists. Poraghajan et al. (2013) provides empirical support for such a claim. The aim of this paper is to statistically evaluate the determinants affecting the level of IC reporting. This study performed a systematic review of the research literature based on this, which begins with a theoretical examination of the assumptions underlying an approach in the corporate sector. The primary ideas that have been considered are agency theory and legitimacy theory. These theories emphasize the importance of IC in resolving conflict between principal and agent or achieving market legitimacy. As a result of its significance, the trend among the world's leading firms is currently toward reporting the company's intangible assets. This can be a challenging aspect of reporting because such measures are difficult to define and are relatively new to the business. According to Abeysekera and Guthrie (2005), there is no established strategy for valuing IC, and as a result, different organizations operating in different regions have used a variety of methods. There is a need for further awareness among companies and investors as to how information related to intellectual capital can help them make comprehensive and profitable investing decisions. Business sustainability reporting and intangible assets or goodwill reporting are certainly closely related to intellectual capital, but from the perspective of IC theory, it cannot be proclaimed that they are the same issue. In the current practice of reporting financial and non-financial information, the area of intellectual capital is not the main focus in reporting.

The authors have used textual analysis to measure the volume of information reported on intellectual capital and a significant added value of this paper is the deconstruction of IC into its individual parts – i.e., human capital, structural capital, and relational capital. This deconstruction enabled a more detailed analysis and revealed a statistically significant relationship for selected determinants even though no such strength of relationship was revealed by the overall IC. By interpreting the statistical results, it is possible to conclude that size and time are crucial factors of intellectual capital disclosure in the annual reports of FTSE 100 companies, which does support the research that has already been done as presented in the literature review. Particularly, the effect of industry is demonstrated, with companies in the services industry emphasizing human capital reporting and companies in the high-tech industry reporting more information on relational capital than companies in other sectors. One interesting finding was the negative significant relationship between the goodwill to assets ratio and the level of structural capital reporting. Table 9 summarizes the statistically significant relationships (+ denotes a positive relationship, - denotes a negative relationship).

Variable	Human capital	Structural capital	Relational capital	Intellectual capital overall
Total assets	+	+	+	+
ROA				
High-tech			+	
Services	+			
Goodwill ratio		-		
Intangib. Ratio				
Year	+	+	+	+

Table 9. Summary of regression analyses

This paper can help to better understand companies' current IC reporting practices and, with further research, standardize reporting of IC, both in terms of the content of disclosures and appropriate taxonomy. The authors of this paper are of the opinion that IC reporting could be embedded within the emerging field of integrated and non-financial reporting, as IC helps companies in terms of their sustainability and value creation. There is potential for a more thorough analysis if future research can widen its scope to include a comparative study of diverse entities in various jurisdictions of developed economies and to study extended periods of time. As the regression analysis in this paper has shown, the area of operation - in other words, the industry - significantly affects the level of reporting of selected parts of the IC. Future research should also focus on evaluating the determinants within each industry, as different IC components are crucial for the sustainability of a company in the high-tech industry compared to the traditional sector, for example. It is also very important to develop the analysis from a qualitative perspective and to evaluate the links between the volume of information and its quality.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

References

Abeysekera, I., & Guthrie, J. (2005). An empirical investigation of annual reporting trends of intellectual capital in Sri Lanka. *Critical Perspectives on Accounting*, 16(3), 151-163. https://doi.org/10.1016/S1045-2354(03)00059-5

Al-Hamadeen, R., &Suwaidan, M. (2014). Content and determinants of intellectual capital disclosure: Evidence from annual reports of the Jordanian industrial, public listed companies. *International Journal of Business and Social Science*, 5(8), 165-175.

Ali, O.A. (2018). The effect of disclosure of intellectual capital components on the market price of shares in Jordanian industrial companies: An empirical study. *International Journal of Economics and Financial Issues*, 8(5), 156.

Andriessen, D. (2004). IC valuation and measurement: Classifying the state of the art. *Journal of intellectual capital*, 5(2), 230-242. https://doi.org/10.1108/14691930410533669

Arifin, J. (2017). Corporate governance and intellectual capital on firm value of banking sector companies listed at Indonesia Stock Exchange in period 2008-2012. *Wacana Journal of Social and Humanity Studies*, 20(1), 36-47. https://doi.org/10.21776/ub.wacana.2017.020.01.5

Astuti, R.N., Fachrurrozie, F., Amal, M., & Zahra, S.F. (2020). Does audit committee quality mediate determinants of intellectual capital disclosure?. *The Journal of Asian Finance, Economics, and Business*, 7(7), 199-208. v

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120. https://doi.org/10.1177/014920639101700108

Bellucci, M., Marzi, G., Orlando, B., & Ciampi, F. (2021). Journal of Intellectual Capital: A review of emerging themes and future trends. *Journal of Intellectual Capital*, 22(4), 744-767. https://doi.org/10.1108/JIC-10-2019-0239

Beretta, V., Demartini, C., & Trucco, S. (2019). Does environmental, social and governance performance influence intellectual capital disclosure tone in integrated reporting?. *Journal of Intellectual Capital*, 20(1), 100-124. v

Bontis, N. (2001). Assessing knowledge assets: A review of the models used to measure intellectual capital. *International Journal of Management Reviews*, 3(1), 41-60. https://doi.org/10.1111/1468-2370.00053

Branco, M., Delgado, C., Sá, M., & Sousa, C. (2010). An analysis of intellectual capital disclosure by Portuguese companies. *EuroMed Journal of Business*, 5(3), 258-278. https://doi.org/10.1108/14502191011080809

Dabić, M., Vlačić, B., Scuotto, V., & Warkentin, M. (2021). Two decades of the Journal of Intellectual Capital: A bibliometric overview and an agenda for future research. *Journal of Intellectual Capital*, 22(3), 458-477. https://doi.org/10.1108/JIC-02-2020-0052

De Silva, T. A., Stratford, M., & Clark, M. (2014). Intellectual capital reporting: A longitudinal study of New Zealand companies. *Journal of Intellectual Capital*, 15(1), 157-172. https://doi.org/10.1108/JIC-03-2013-0034

De Villiers, C., & Sharma, U. (2020). A critical reflection on the future of financial, intellectual capital, sustainability and integrated reporting. *Critical Perspectives on Accounting*, 70, 95-106. https://doi.org/10.1016/j.cpa.2017.05.003

Dey P., & Faruq M. (2019). Determinants of intellectual capital disclosure: an investigation on DS30 firms in Bangladesh. *Asian Journal of Accounting Perspective*s 12, 27-48. https://doi.org/10.22452/AJAP.vol12no2.2

Duff, A. (2018). Intellectual capital disclosure: Evidence from UK accounting firms. *Journal of Intellectual Capital*, 19(4), 768-786. https://doi.org/10.1108/JIC-06-2017-0079

Eddine, C.O.H., Abdullah, S.N., Hamid, F.A., & Hossain, D.M. (2015). The determinants of intellectual capital disclosure: A meta-analysis review. *Journal of Asia Business Studies*, 9, 232-250. https://doi.org/10.1108/JABS-03-2015-0028

Farooq, O., & Nielsen, C. (2014). Improving the information environment for analysts. *Journal of Intellectual Capital*, 15, 10. https://doi.org/10.1108/JIC-12-2012-0109

Feimianti, E., & Anantadjaya, S.P. (2014). Value creation of intellectual capital: Financial performance analyses in Indonesian publicly-listed consumer goods industry. *RIBER: Review of Integrated Business and Economics Research*, 3(1), 99-113.

Fernandes, M., & Mergulhão, J. (2016). Anticipatory effects in the FTSE 100 index revisions. *Journal of Empirical Finance*, 37, 79-90. https://doi.org/10.1016/j.jempfin.2016.02.009

Ferreira, A.L., Branco, M.C., & Moreira, J.A. (2012). Factors influencing intellectual capital disclosure by Portuguese companies. *International Journal of Accounting and Financial Reporting*, 2(2), 278. https://doi.org/10.5296/ijafr.v2i2.2844

Forte, W., Tucker, J., Matonti, G., &Nicolò, G. (2017). Measuring the intellectual capital of Italian listed companies. *Journal of Intellectual Capital*, 18(4), 710-732. https://doi.org/10.1108/JIC-08-2016-0083

Frankforter, S.A., Berman, S.L., & Jones, T.M. (2000). Boards of directors and shark repellents: Assessing the value of an agency theory perspective. *Journal of Management Studies*, 37(3), 321-348. https://doi.org/10.1111/1467-6486.00183

Guthrie, J., & Petty, R. (2000). Intellectual capital: Australian annual reporting practices. *Journal of intellectual capital*, 1(3), 241-251. https://doi.org/10.1108/14691930010350800

Haji, A.A. (2015). The role of audit committee attributes in intellectual capital disclosures. *Managerial Auditing Journal*, 30(8/9), 756-784. https://doi.org/10.1108/MAJ-07-2015-1221

Hatane, S.E., Wijaya, A.T., William, A., & Haryanto, A.D. (2018). Factors affecting intellectual capital disclosures: A case of primary cectors in Thailand. *Journal of Economics and Business*, 1(4), 513-523. https://doi.org/10.31014/aior.1992.01.04.46

Holland, J. (2003). Intellectual capital and the capital market–organisation and competence. *Accounting, Auditing & Accountability Journal*, 16(1), 39-48. https://doi.org/10.1108/09513570310464264

IASB (2004). *IAS 38 Intangible Assets. International Financial Reporting Standards*. IFRS Foundation. Retrieved from: https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-38-intangible-assets.pdf

Kamath, B. (2017). Determinants of intellectual capital disclosure: Evidence from India. *Journal of Financial Reporting and Accounting*, 15(3), 367-391. https://doi.org/10.1108/JFRA-01-2016-0003

Kateb, I. (2014). The determinants of intellectual capital disclosure: Evidence from French stock exchange. *International Journal of Accounting and Financial Reporting*, 4(2), 628. https://doi.org/10.5296/ijafr.v4i2.6579

Karamanou, I., & Vafeas, N. (2005). The association between corporate boards, audit committees, and management earnings forecasts: An empirical analysis. *Journal of Accounting Research*, 43(3), 453-86. https://doi.org/10.1111/j.1475-679X.2005.00177.x

Leadbeater, C., & London, D. (1999, June). *New measures for the new economy.* In International symposium on measuring and reporting intellectual capital: Experience, issues, and prospects.

Maditinos, D., Chatzoudes, D., Tsairidis, C., &Theriou, G. (2011). The impact of intellectual capital on firms' market value and financial performance. *Journal of intellectual capital*, 12(1), 132-151. https://doi.org/10.1108/14691931111097944

Mangena, M., Li. J. & Pike, R. (2012). The effect of audit committee characteristics on intellectual capital disclosure. *The British Accounting Review*, 44(2), 98-110. https://doi.org/10.1016/j.bar.2012.03.003

Mangena, M., Pike, R.H., & Li, J. (2016). *Intellectual capital disclosure practices and effects on the cost of equity capital: UK evidence.* 10.13140/RG.2.2.15941.65762.

Marisanti, M., & Kiswara, E. (2012). Analisis Hubungan Profitabilitas Terhadap Pengungkapan Intellectual Capital. *Diponegoro Journal of Accounting*, 1(1), 537-545.

Martini, S.B., Corvino, A., Doni, F., & Rigolini, A. (2016). Relational capital disclosure, corporate reporting and company performance: Evidence from Europe. *Journal of Intellectual capital*, 17(2), 186-217. https://doi.org/10.1108/JIC-07-2015-0065

Matinfard, M., & Khavari, A. (2015). The impact of intellectual capital on firm performance: Evidence from Tehran Stock Exchange. *Management Science Letters*, 5(11), 1005-1016. https://doi.org/10.5267/j.msl.2015.8.011

Mehrotra, V., Malhotra, A.K., & Chauhan, A.K. (2017). Determinants of intellectual capital disclosure-Indian companies. *International Journal of Learning and Intellectual Capital*, 14(4), 366-387. https://doi.org/10.1504/IJLIC.2017.087374

Mobus, JL. (2005). Mandatory environmental disclosures in a legitimacy theory context. *Accounting, Auditing & Accountability Journal*, 18(4), 492-517. https://doi.org/10.1108/09513570510609333

Morariu, C.M. (2014). The determinants of intellectual capital disclosure: Evidence from Romania. In *Accounting in Central and Eastern Europe* (Vol. 13, pp. 163-186). Bingley: Emerald Group Publishing Limited. https://doi.org/10.1108/S1479-3563(2013)0000013012

Ousama, A.A., & Fatima, A.H. (2010). Factors influencing voluntary disclosure: empirical evidence from Shariah approved companies. *Management & Accounting Review (MAR)*, 9(1), 85-103.

Ousama, A.A., Fatima, A.H., & Hafiz-Majdi, A.R. (2012). Determinants of intellectual capital reporting. *Journal of Accounting in Emerging Economies*, 2, 119-139. https://doi.org/10.1108/20421161211229808

Petty, R., & Cuganesan, S. (2005). Voluntary disclosure of intellectual capital by Hong Kong Companies: Examining size, industry and growth effects over time. *Australian Accounting Review*, 15, 40 -50. v

Poraghajan, A., Ramezani, A., & Mohammadzadeh, S. (2013). Impact of intellectual capital on market value and firms' financial performance: Evidences from Teheran Stock Exchange. *World of Sciences Journal year 2013*, 1(12), 197-208.

Quintero-Quintero, W., Blanco-Ariza, A., & Garzón-Castrillón, M. (2021). Intellectual Capital: A Review and Bibliometric Analysis. *Publications*, 9(4), 46. https://doi.org/10.3390/publications9040046

Rahman, M.M., Sobhan, R., & Islam, M.S. (2019). Intellectual capital disclosure and its determinants: Empirical evidence from listed pharmaceutical and chemical industry of Bangladesh. *The Journal of Business Economics and Environmental Studies*, 9(2), 35-46. https://doi.org/10.13106/jbees.2019.vol9.no2.35

Rahman, M.M., Sobhan, R., & Islam, M.S., (2020). The impact of intellectual capital disclosure on firm performance: Empirical evidence from the pharmaceutical and chemical industry of Bangladesh. *The Journal of Asian Finance, Economics, and Business*, 7(2), 119-129. https://doi.org/10.13106/jafeb.2020.vol7.no2.119

Rambe, P.A., Dewi, C., Muda, I., & Ginting, S. (2020). Determinants of intellectual capital disclosure by using monetary and non-monetary variables. *1st Unimed International Conference on Economics Education and Social Science*, 1097-1102.

Schiemann, F., Richter, K., & Günther, T. (2015). The relationship between recognised intangible assets and voluntary intellectual capital disclosure. *Journal of Applied Accounting Research*, 16(2), 240-264. https://doi.org/10.1108/JAAR-11-2012-0076

Spence, M. (1974). *Market signaling: Informational transfer in hiring and related screening processes* (No. 143). Cambridge: Harvard University Press. https://doi.org/10.2307/2521860

Sudibyo, A.A., & Basuki, B. (2017). Intellectual capital disclosure determinants and its effects on the market capitalisation: Evidence from Indonesian listed companies. In *SHS Web of Conferences* (Vol. 34, p. 07001). EDP Sciences. https://doi.org/10.1051/shsconf/20173407001

Taliyang, S.M., Abdul Latif, R., & Mustafa, N.H. (2011). The determinants of intellectual capital disclosure among Malaysian listed companies. *International Journal of Management and Marketing Research*, 4(3), 25-33.

Terblanche, W., & De Villiers, C. (2019). The influence of integrated reporting and internationalisation on intellectual capital disclosures. *Journal of Intellectual Capital*, 20(1), 40-59. https://doi.org/10.1108/JIC-03-2018-0059

Van der Meer-Kooistra, J., & Zijlstra, S.M. (2001). Reporting on intellectual capital. *Accounting, Auditing & Accountability Journal*, 14(4), 456-476. https://doi.org/10.1108/09513570110403461

Vergauwen, P.G. & Van Alem, F.J. (2005). Annual report IC disclosures in the Netherlands, France and Germany. *Journal of Intellectual capital*, 6(1), 89-104. https://doi.org/10.1108/14691930510574681

White, G., Lee, A., Yuningsih, Y., Nielsen, C., & Bukh, P.N. (2010). The nature and extent of voluntary intellectual capital disclosures by Australian and UK biotechnology companies. *Journal of Intellectual Capital*, 11(4), 519-536. https://doi.org/10.1108/14691931011085669

Whiting, R.H., & Woodcock, J. (2011). Firm characteristics and intellectual capital disclosure by Australian companies. *Journal of Human Resource Costing & Accounting*, 15(2), 102-126. https://doi.org/10.1108/14013381111157337

Wiley (2021). *Wiley IFRS 2021: Interpretation and Application of IFRS Standards*. PKF International Ltd.

Williams, S.M. (2001). Is intellectual capital performance and disclosure practices related?. *Journal of Intellectual Capital*, 2(3), 192-203. https://doi.org/10.1108/14691930110399932

Zéghal, D., & Maaloul, A. (2010). Analysing value added as an indicator of intellectual capital and its consequences on company performance. *Journal of Intellectual Capital*, 11(1), 39-60. https://doi.org/10.1108/14691931011013325

Appendix 1

Glossary of terms defining the individual components of IC

Human capital	Structural capital	Relational capital	Intellectual capital
human	Management	Relation	Intellect
humans	Managements	Relational	Intellectual
employee	Innovation	Relations	VAIC
employees	Innovations	Relationship	Intellectus
employment	Technology	Relationships	IC
knowledge	Technologies	Customer	IC´s
expertise	Method	Customers	+ terms for human capital
expert	Methods	Supplier	+ terms for struc. capital
learning	Methodology	Suppliers	+ terms for relati. capital
gender	Methodologies	Reputation	
genders	System	Reputations	
diversity	Systems	Brand	
skill	Organizational	Brands	
skills	Learning	Branding	
education	Process	Market	
educate	Processes	Markets	
educational	Structure	Marketing	
engagement	Structures	Segment	
engagements	Culture	Segments	
advocacy	Cultures	Trademark	
experience	Diversity	Trademarks	
experiences	Research	Logo	
age	Development	Logos	
staff	R&D	Image	
labour	Capability	Images	
workforce	Capabilitites	Client	
people	Workspace	Clients	
person	Outsourcing	Partner	
persons	CRM	Partners	
personality	Documentation	Partnership	
Personnel	Documentations	Partnerships	
talent	Software	Contact	
talents	Softwares	Contacts	
HR	Patent	Legacy	
training	Patents	Environment	
trainings	Rights	Environments	
behaviour	Strategy	Environmental	
motivation	Strategies	CO2	
motivations	Intangible	Emission	
motivational	Intangibles	Emissions	
attitude	Database	Ecology	
attitudes	Databases	Eco	
creativity	Structure	Loyalty	
creativness	Structures	Sustainability	
health	Structural	Social	
healthy	Governance	Socials	
Life	Governances	Stakeholder	
Lifestyle	Goodwill	Stakeholders	
Communication	Goodwills	intermediary	
Well-being	Know-how	intermediaries	

Appendix 2

Sector structure of the dataset

Sector	Industry	Number of entities	Percentage
Aerospace & Defence	High-tech industry	3	3.00%
Asset Managers	Services	1	1.00%
Automobiles & Parts	Traditional industry	1	1.00%
Banks	Services	5	5.00%
Beverages	Traditional industry	2	2.00%
Construction & Materials	Traditional industry	1	1.00%
Electricity	Traditional industry	1	1.00%
Electronic & Electrical Equipment	High-tech industry	1	1.00%
Equity Investment Instruments	Services	1	1.00%
Financial Services	Services	7	7.00%
Fixed Line Telecommunications	Services	1	1.00%
Food & Drug Retailers	Traditional industry	3	3.00%
Food Producers	Traditional industry	1	1.00%
Forestry & Paper	Traditional industry	1	1.00%
Gas. Water & Multi-utilities	Traditional industry	3	3.00%
General Industrials	Services	3	3.00%
General Retailers	Traditional industry	2	2.00%
Health Care	High-tech industry	1	1.00%
Health Care Equipment & Services	Services	1	1.00%
Household Goods & Home Construction	Traditional industry	5	5.00%
Chemicals	Traditional industry	1	1.00%
Industrial Engineering	Traditional industry	1	1.00%
Industrial Metals & Mining	Traditional industry	1	1.00%
Industrial Transportation	Services	1	1.00%
Industrials	Traditional industry	1	1.00%
Investment Services	Services	1	1.00%
Life Insurance	Services	4	4.00%
Media	Services	7	7.00%
Mining	Traditional industry	6	6.00%
Mobile Telecommunications	Services	1	1.00%
Nonlife Insurance	Services	1	1.00%
Oil & Gas Producers	Traditional industry	2	2.00%
Personal Goods	Traditional industry	2	2.00%
Pharmaceuticals & Biotechnology	High-tech industry	3	3.00%
Precious Metals & Mining	Traditional industry	1	1.00%
Real Estate Investment Trusts	Services	3	3.00%
Retail hospitality	Services	1	1.00%
Retailers	Traditional industry	2	2.00%
Software & Computer Services	High-tech industry	3	3.00%
Support Services	Services	8	8.00%
Tobacco	Traditional industry	2	2.00%
Travel & Leisure	Services	4	4.00%
Total		**100**	**100.00%**