



# An Assessment of the Influence of Structural Capital Disclosure on the Value of Listed Service Firms in Nigeria

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## Authors' contributions

This work was carried out in collaboration between authors ISA and GAF. Author ISA designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author GAF performed the statistical analysis and managed the analyses of the study, managed the literature searches. Both authors read and approved the final manuscript.

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## ABSTRACT

The purpose of this study was to assess the influence of structural capital disclosure on the value of listed service firms in Nigeria. This study employed a quantitative research approach, using data from annual reports and financial statements of 23 listed service firms in Nigeria. The sample was selected using a census sampling technique. The study used multiple regression analysis coupled with correlation analysis. From the findings that emerged from the result, the study concluded that structural capital disclosure proxy by organisational, process, and innovation capital disclosures significantly influence the value of listed service firms in Nigeria. Given this finding, the study recommends that a framework for such disclosure should be institutionalized as firms want to limit this type of disclosure because of business secrecy and competitors' disadvantage costs.

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**Keywords:** Firm value; innovation capital disclosure; organisational capital disclosure; process capital disclosure; structural capital disclosure.

## 1. INTRODUCTION

In recent years, there has been a growing interest in understanding the various factors that contribute to the value of listed service firms. One factor that has gained attention is the disclosure of structural capital information. Structural capital refers to non-physical assets owned by an organisation that enable human capital to function successfully [52]. It is also thought to be one of the three basic components of intellectual capital, which are the resources that allow human capital to function [65].

The disclosure of structural capital information has been regarded as a critical component of corporate reporting because it offers stakeholders useful insights into a company's non-tangible assets. By disclosing structural capital information, listed service organisations can highlight their intangible assets, potentially influencing investors' perceptions of the firm's value. Based on this, Ani et al. [9] argued that managers should reveal intellectual capital relevant to market demands and prioritise information quality to increase firm value.

However, traditional accounting methods have not captured the extent to which structural capital disclosure affects the value of listed service organisations [70,104]. Based on this, Starovic and Marr [93] and Li [61] asserted that the current financial accounting models do not seek to value a firm in its totality but record each of its distinct assets at an amount in line with the existing standards and legislation. Ma and Zhang [64] opined that this has resulted in a significant quantity of unrecognised value in enterprises' financial reports. While previous research has investigated the impact of other types of disclosure on firm value, only a few empirical studies have specifically evaluated the relationship between structural capital disclosure and company value in the service sector using enterprise value [1,2].

This study, therefore, seeks to fill this research gap by analysing the impact of structural capital disclosure on the value of publicly traded service organisations. This study aims to provide empirical evidence on the possible influence of structural capital disclosure on firm value by examining service firms' disclosure policies and stock market performance [8]. By undertaking this assessment, the study will give information

on the relevance and effectiveness of structural capital disclosure as a strategy for increasing the value of publicly traded service organisations. This study's findings will not only add to the existing research on corporate disclosure and business value, but will also provide useful insights to practitioners, legislators, and other stakeholders.

The following parts will cover the theoretical framework, empirical methodology, data sources, and analytical approaches that were employed in this assessment. Additionally, the study will show and analyse the findings. The study's comprehensive assessment will deepen understanding of the impact of structural capital disclosure on the value of listed service firms and provide recommendations for firms and policymakers looking to maximise their value in the service industry.

## 2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

This section covers the literature and studies undertaken by researchers on the impact of structural capital disclosure on the value of listed service firms.

### 2.1 Conceptual Review

The concepts of structural capital disclosure and firm value concerning this study were reviewed. This includes disclosing organisational, process, and innovation information. The concept of firm value was linked to enterprise value and total asset ratio.

#### 2.1.1 Firm value

Several definitions of firm value have been proposed by scholars [17, 26, 37, 38, 102]. This includes net assets, earnings, and market capitalization. Traditional definitions centred on a firm's total assets, which included both monetary and non-monetary resources. Based on this, Lonkani [63] argued that a firm's value equals the amount of money invested minus any debt due because firms were owned and operated on an individual basis. According to Rindova [82], financial measures of firm value are measurements of the economic value of the assets a firm holds and the predicted potential to employ these assets in creating economic returns.

On the other hand, the emergence of businesses has altered the definition and assessment of firm value. A firm's value is also known as liquidation value, book value, intrinsic value, market value, nominal value, investment value, and fair value [3,65]. Martin-Reyna et al. [68] defined book value as the value of a firm's net assets as represented in its financial statements. In terms of investment value, Dang et al. [26] opined that firm value is the current and future income that a company can generate. Widigdo [102], on the other hand, defined firm value as investors' view of the company's true worth as reflected in share price. In terms of potential, Endri [37] opined that firm value is the anticipated present value of a sequence of future cash flows that a firm will generate in the future. Thus, the value of a firm is an indication of the worth of a company as appraised by stock exchange market players [17].

The growing demand for more information has challenged traditional views on a firm's value. According to Widigdo [102] and Moeljadi and Supriyati [71], the concept of firm value has evolved in recent times. However, researchers have recently agreed that a firm's value is defined as the worth of the resources it creates for stakeholders, as well as the value it generates for society and the environment [3, 26, 63]. A firm's value is, therefore, a combination of natural, human, intellectual, manufacturing, social, relationship, and financial capital. CIMA's 2016 annual report suggested that a firm's value contains other forms of value that firms create through the decrease, increase, or transformation of different types of capital, each impacting financial returns.

On the other hand, a firm's value is determined by its relationships with stakeholders, the environment, and society. This study, therefore, conceptualizes a firm's value as the overall market value of a firm's resources, which includes the sum of claims by all stakeholders, including creditors (secured and unsecured), shareholders (preferred and common), non-controlling minority interest, and cash and cash equivalents. The reflection of this in market price depends on the disclosure of every resource used by an organisation.

### **2.1.2 Structural Capital Disclosure**

The concept of structural capital refers to information resources, processes, technologies, and intellectual property rights [6,42,66]. It is a

firm's essential component that offers strength through consistent relationships [19]. Structured capital serves as a firm's foundation. Its value is assessed by how successfully it helps a company organise and utilise human capital. The success of this organisation in achieving the firm's objectives determines its value.

However, Spacey [91] opined that structural capital is separate from human capital. This has a significant impact on the development of human and intellectual capital. Van-Caenegem [96] emphasised that such capital belongs to the company. It comprises resources such as databases, organisational frameworks, manuals, and training materials. According to Edvinsson and Malone [34] and Bontis et al. [16], it is non-human knowledge gained from corporate processes. Knowledge of this capital generates structures that facilitate development [42].

Accordingly, Edvinsson [34] classified structural capital into three categories: organisation, process, and innovation capital. This classification forms the basis of structural capital being created by employee yet owned by an organisation. De Villiers & Sharma [27] related this to mechanisms and structures that support employee performance. According to this study, structural capital is the knowledge embedded in firms' processes, procedures and routines that enable other forms of capital to function effectively [47].

#### *2.1.2.1 Organisational capital disclosure*

There is no agreement on the concept of organisational capital, its measurement, or its contribution to output [15]. What made it difficult was that organisational capital is firm-specific [92]. This implies that each organisation has distinct organisational, structural, and operational characteristics. However, Black and Lynch [15] contended that it is the techniques employed by organisations to boost productivity. This includes employee training, job design, and investments in the firm's processes, culture, and structure [67].

However, Ruta and Macchitella [84] asserted that organisational capital encompasses all knowledge that has been accumulated and embedded through various tools. This defines organisational capital as knowledge transmission from employees. According to Di and Guo [32] and Wang [100], organisational capital constitutes a phenomenon that converts employees' knowledge, skills, and experience

into firm resources. Eisefeldt and Papaniko-laouz [36] contended that it is an internal structure that influences performance while directing other aspects of intellectual capital.

Zhou et al. [105] proposed that organisational capital was a firm's distinctive knowledge for utilising its resources. This demonstrates the firm's ability in resource utilisation and allocation for sustaining and implementing initiatives. Wang [99] opines this as a resource for optimising the use of other dimensions of intellectual capital. It is an investment that determines the firm's position directions and a reservoir of knowledge implanted at the organisational level [11].

According to Spacey [91], organisational capital is a component of a company's culture that allows employees to be more productive and creative. It allows actual and intangible resources to be productive. According to Lev et al. [59], it is the most valuable asset that firms have because it directs other types of intellectual capital. In contrast, Bryl [20] and Benevene et al. [13] asserted that it is the policies and processes, research and development programmes, and ideas that drive innovation and performance.

According to the OECD/Eurostat [75], firm operations are managed by a combination of knowledge, processes, and systems. The combination of these entails organisational capital. It is firm-specific knowledge that leads to higher performance, but it is manifested through technologies, practices, procedures, and designs [45, 60]. Accordingly, organisational capital disclosure is knowledge of the worth of entity-specific resources that allow humans to work efficiently, optimise procedures, produce innovations, and gain effective relational advantages.

### 2.1.2.2 Process capital disclosure

The concept of process capital comprises a series of value-added activities, performed by employees to achieve business objectives [56]. The investment in such activities represents process capital. Based on this, Spacey [91] stated that process capital is a class of intangible assets that improve business processes. Such assets include process design, systems, tools, research, and development. However, Mathies [69] averred that it is an intangible resource that represents knowledge and competencies required for value generation. It revolves around investment in procedures that make up a firm's processes.

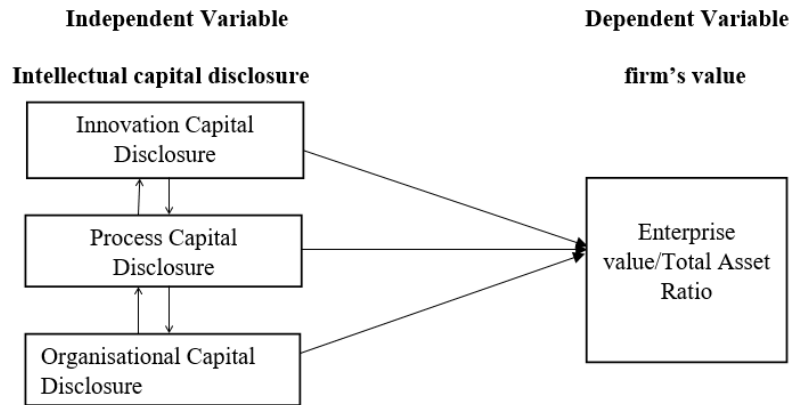
Brenner et al [18] posited that it is derived from the techniques, procedures, and programs that enhance the delivery of goods and services. This concept is more akin to manufacturing firms' processes. Githaiga [41], however, asserted that it is the knowledge resources concerning a firm's operation. The disclosure of process capital entails firm-specific information on the firm's ways of doing things. Castillo [21] stated that it contains procedures, practices, and activities that promote value creation. Process capital is the economic value of an entity's processes. Based on these, process capital disclosure is the information on the value of processes created by an entity for achieving goals.

### 2.1.2.3 Innovation capital disclosure

Researchers have tried to conceptualize innovation capital based on technological, organisational, and sociological changes in an organisation. Edvinsson and Malone [34], Tseng and Goo [95], and Kijek [53] averred that it is the capabilities used to create, introduce, and commercialize new products and services to the market. This involves investment in capacities to produce new products through the development of processes, services, and technology.

Chen et al. [23] suggested that it is based on the competence of organizing and implementing research and development. The outcome of such is the development of new technology and products. This shows the value of knowledge in both technological and organisational activities. Hsu and Mykytyn Jr. [107] and Schwartz [86] posited that innovation capital falls under the branch of explicit knowledge and facilitates organisational learning. This idea describes how businesses can use knowledge to gain scale, breadth, and as well as differentiation. It is the investment in this type of knowledge to create ideas, products, services, and inventions [88].

However, Duran et al. [33] and Audretsch and Link [10] argued that innovation capital is derived from human, social, and reputation capital. It is the investment and management of these forms of capital that bring forth innovation capital. Alkalouti et al. [7], however, opined that innovation capital is the capability to turn novel ideas into reality. Such is reflected in the value of intellectual property and other intangible assets. In this regard, innovation capital disclosure is the portrayal of information on the value of organisation resources that go to creating new ideas, products, services, and inventions.



**Fig. 1. The conceptual framework**  
 Source: Author's Conceptualisation, (2023)

### 2.1.3 Organisational capital disclosure and firm's value

Prior studies have suggested that organisation capital is the mechanism on which various other forms of capital rest [100]. The interaction of these resources based on this mechanism increases firm value. Lev et al. [59], therefore, stated that it can be an institutional arrangement which integrates all resources in the firms. Kirwa and Ngeno [55], however, posited that it is a structural element of firms' culture independent of employees. This structural element consists of business processes and systems, rules, norms, and relationships. Firms should, therefore, disclose information about these resources.

However, Barbieri et al. [11] suggested that it is the knowledge embedded in a firm's structure. This includes knowledge of the firm's routines, systems, culture and processes. This conceptualization is based on the know-how embedded in the firm's structure. Evenson and Westphal [39] averred that it is the knowledge used to combine human skills and physical capital into systems. The disclosure of these forms of capital might meet the information needs of the stakeholders.

### 2.1.4 Process capital disclosure and firm's value

The concept of process capital refers to a set of value-added activities conducted by personnel to fulfil corporate goals [56]. The investment in such operations is considered process capital. Based on this, Spacey [91] defined process capital as a kind of intangible assets that improve company processes. Such assets include process design, systems, tools, and research and development.

However, Mathies [69] asserted that it is an intangible resource that embodies the knowledge and competencies required for value creation. It focuses on investing in the procedures that comprise the firm's processes.

According to Ordonez de Pablos [77], process capital disclosure entails providing an aggregate of value-creating and non-value-creating processes. Such value must be included as part of the information in the financial report. This need stems from a desire to meet the expectations of stakeholders. However, Van den Berg [97] claimed that the value of process capital is demonstrated by the efficient use of important components of firms' resources. It is one of the components of the firm's worth, hence its disclosure is critical to meeting stakeholders' expectations.

### 2.1.5 Innovation capital disclosure and firm's value

Nadeem et al. [72] and Aditya and Kaswar [4] defined innovation capital as a firm's investment in research and development. Yuliya et al. [103] noted that it indicates the firm's ability to generate and exploit new knowledge and developments. While innovation is a crucial driver of corporate success, information about it is critical [12]. This is because improving innovation capital can be accomplished by boosting the flow of knowledge generation [4]. Thus, knowledge is the source of innovation, and providing information about it would assist people to realise the value of businesses.

However, a study conducted by Sorescu and Spanjol [90] found that when a company achieves an inventive breakthrough, its value

increases. This could lead to a rise in sales and earnings. Hsiao [50] claimed that innovation capital has a significant positive impact on a company's worth. This implies that a firm's worth rises with its innovation capital. According to Kuo-Ming and Huang [57], innovation capital influences business growth and long-term value. Simison [87], on the other hand, stated that increased access to information regarding a firm's innovation capital allows investors to make better selections.

### **2.1.6 Conceptual framework**

## **2.2 Theoretical Review**

This study applied signalling and legitimacy theory. While signalling theory describes the type of information that should be made public, legitimacy theory depicts the choice of disclosure, as well as the scope and content of that disclosure.

### **2.2.1 Signalling theory**

Signalling theory was introduced by Michael Spence in 1973. According to the signalling theory, various stakeholders should have equitable access to information at all times and promptly [98]. While weighing the cost and benefit of information sharing, no group should be at a disadvantage. Ehrhardt and Brigham [35], however, stated that it is an action made by management to highlight the company's potential. Stakeholders want to know the prospects of firms to make decisions. Based on this, Harmadji et al. [44] proposed that it depicts the disclosure of a company's success or failure. Accordingly, Puspitaningtyas [80] believed that it assumes investors' perceptions of enterprises' prospects through trustworthy reporting and disclosure.

To suit the needs of stakeholders, all information about an organisation should be published. Based on this, Dewiyanti [31] opined that signalling theory leads to larger disclosure and greater disclosure boosts a company's worth. It also decreases information gaps between companies and stakeholders [14]. Signals, however, are context-dependent and subjective, thus the cost should be balanced against their benefits.

### **2.2.2 Legitimacy theory**

In 1975, Dowling and Pfeffer proposed the legitimacy hypothesis. The legitimacy theory

presupposes that the actions of businesses must align with the expectations, norms, and values of society [30,31]. For a business to be successful, it must continue to be accepted by the community. Thus, the information disclosed presents a socially responsible organisation [49]. According to Zyznarska-Dworczak [106], there is a social agreement between a company and society, and voluntary disclosure involves meeting community expectations [25,28,30].

Legitimacy theory has been applied to social and environmental disclosure, economic ventures, and environmental accounting [40,43]. Nonetheless, adequate and relevant disclosure is required by stakeholders' expectations [73]. According to Olateju et al. [76], failure to achieve these expectations may jeopardise the organisation's survival. For the organisation to be considered legitimate, full disclosure must be maintained.

Organisations must understand and connect their actions and behaviours with society's expectations. One approach to this is to disclose information about a company's operations. Firms may face challenges if their activities and behaviours do not align with cultural and social expectations. However, a discrepancy between how society believes an entity should act and how the organisation is perceived to have acted creates a "legitimacy gap" [29].

## **2.3 Empirical Review**

Several studies have investigated the empirical relationship between firms' value and structural capital disclosure using the above theoretical review. These studies present divergent perspectives, and the findings were examined according to the study's objectives.

### **2.3.1 Organisational capital disclosure and firms' value**

Considering the rise of integrated reporting, Salvi et al. [85] conducted empirical research on the impact of intellectual capital on business value-creation processes. Based on a sample of 110 firms, the findings revealed a significant positive link between structural, human, social, and relational capital, and company value. On the other hand, Ahmed et al. [5] explored the link between organisational complexity and multiple capital disclosure in European firms' integrated reports. The study used content analysis from 81 firms from 2014-2020. Results showed industrial complexity significantly influenced multiple

capital disclosure, while geographical complexity did not.

Again, Hasan [46] investigated the effect of organisational capital on corporate risk and how it varied among organisations. Using a sample of US data from 1981 to 2019, the study discovered that organisational capital was favourably connected to idiosyncratic and total risk, but negatively related to systematic risk. The positive association was stronger for organisations with substantial information asymmetry and human capital. The negative association was stronger for firms that were more efficient and faced higher industry and economy-wide risks.

Panta and Panta [78] employed the pooled OLS technique to investigate the effect of organisational capital on the readability of 10-K reports for a large sample of US corporations from 1993 to 2019. The major finding was that companies with stronger organisational capital produced more comprehensible 10-Ks. Even after the SEC's Plain English Rules were implemented in 1998, the impact of organisational capital on readability persisted. Our findings also showed that organisational capital mitigated the negative impact of loss on the readability of annual reports. Overall, our findings highlighted the significance of organisational capital in how a company communicates information in its annual reports.

Also, Githaiga [41] evaluated the relationship between intellectual capital (IC) and bank performance in East African banks using a panel dataset from 2010-2018. Results showed that IC significantly impacted bank performance, while income diversification had a negative effect. Income diversification reduced the overall impact of IC efficiency, but its moderating role varies. Income diversification increased the influence of structural capital efficiency (SCE) on bank performance while decreasing the effect of human capital efficiency (HCE). Furthermore, revenue diversification did not mitigate the effect of capital employed efficiency (CEE) on bank performance.

Skhvediani et al. [89] examined the relationship between intellectual capital and performance indicators of Russian manufacturing companies. The study analysed 23,494 observations from 2017-2020. The results showed that intellectual capital positively impacted both structural and human performance. However, the impact of structural and human capital on performance indicators was lower than the capital employed.

From 2018 to 2022, Sutisna et al. [108] assessed how Value-Added Capital Employed (VACA), Value-Added Human Capital (VAHU), and Structural Capital Value Added (STVA) affected the financial performance of 41 manufacturing companies listed on the Indonesia Stock Exchange. The findings indicated that VACA had a positive and significant effect on financial performance, VAHU had a positive but minor effect, and TVA had a positive and substantial effect on financial performance. Based on the reviewed studies, the following hypothesis was formulated:

*H<sub>0</sub>: The value of listed service firms in Nigeria is not significantly impacted by organisational capital disclosures.*

### **2.3.2 Process capital disclosure and firms' value**

From 2009 to 2018, Weqar et al. [101] studied the impact of intellectual capital on the financial performance of knowledge-driven enterprises in India using the Bombay Stock Exchange's finance index. The results demonstrated that the Value-Added Intellectual Coefficient (VAIC™) had a negligible link with profitability and productivity. Capital utilised efficiency had a substantial positive relationship exclusively with profitability. The analysis also discovered that SCE was insignificant for all financial performance metrics.

Furthermore, Pigatto et al. [79] assessed the value creation concept in the integrated reporting (IR) framework by analysing the quality of disclosures produced. This included six capitals (6Cs) in value creation disclosures. A bespoke Integrated Disclosure Index was used in the analysis to integrate content analysis with quantitative metrics. The findings indicated that the 6Cs were well revealed in form but only partially in substance. Overall, the integration of capital, content parts, and guiding principles were above average.

On the other hand, Rieg and Vanini [81] analysed the value relevance of voluntary intellectual capital disclosure (ICD), revealing mixed results from 40 primary studies. The results supported ICD's value relevance, resulting in higher market value, lower equity cost, and better accounting performance. The authors suggested standardizing disclosure standards and implementing a standardized scale for measuring voluntary ICD to improve

disclosure quality. Based on the above review, the following hypothesis was formulated:

*H<sub>0</sub>: The value of listed service firms in Nigeria is not significantly impacted by process capital disclosures.*

### 2.3.3 Innovational capital disclosure and firms' value

Lahyani and Ayadi [58] explored the impact of corporate governance frameworks on innovation capital disclosure (ICD) among 120 listed enterprises in France. The study discovered that independent non-executive directors (INEDs) took a conservative approach to innovation, limiting publicly available information to preserve intellectual property. Board tenure influenced the link between INEDs and ICDs. The study emphasized the significance of financial reporting in a knowledge-based economy and offered insights for executives, policymakers, and regulators.

Kim and Valentine [54] conducted a study on the effects of public firm disclosures on the patent trading market. The study demonstrated that increasing public corporate visibility resulted in a 9.4% rise in future patent sales. The correlation was stronger in places with higher information asymmetry and uncertainty. The study emphasized the relevance of financial statement disclosure in promoting patent sales. On the other hand, Chen et al. [22] investigated the effect of information disclosure on firms' investment in follow-up innovation. The study discovered a favourable relationship between transparency and follow-on innovation, with the effect varying with technological uncertainty.

Again, Chu et al. [24] examined the features of innovation disclosures in new product announcements using a text-based metric. The study discovered that stock prices responded positively to announcements with more detailed disclosure, implying higher future sales. However, when managers were given stronger incentives and weaker corporate governance structures, their predictive ability declined. Glaeser and Lang [109] reviewed accounting literature on innovation, focusing on its economic qualities including novelty, nonrivalry, and partial excludability. The study examined definition, measurement, and frequent pitfalls in quantifying innovation. It also evaluated the literature on disclosure, management, financial reporting, taxation, and finance. According to the above-

analysed literature, the following hypothesis was formulated:

*H<sub>0</sub>: The value of listed service firms in Nigeria is not significantly impacted by innovational capital disclosures.*

## 3. METHODOLOGY

The study's population, sampling size, methods, research design, and data sources are all covered in the methodology section.

### 3.1 Research Design

Because the data for this study were derived from previous economic events, an ex-post factor research method was used. The structural capital disclosure was examined using text analysis and a disclosure index to determine the level of disclosure among publicly traded service firms. The enterprise value to assets ratio was employed to measure the firm's value. As of December 31, 2023, the population consisted of 23 service firms that were listed on the Nigerian Exchange. This study used census sampling methodologies. This study spanned fourteen years, from 2010 to 2023. The data was collected and analysed using basic statistical tools (Stata 15) that offer descriptive and inferential information about the variables investigated.

### 3.2 Model Specification

The mathematical notion that this study employed is indicated in the model specification. This is based on a theoretical understanding of the relationship between independent and dependent variables. In accordance with Jardon and Martinez-Cobas [51], the study stated the model in econometric form as follows:

$$FV_{it} = f(STCD) \dots\dots\dots \text{Eqn (1)}$$

$$FV_{it} = f(OCD, PCD, ICD)$$

$$EVTA_{it} = \beta_0 + \beta_1(OCD) + \beta_2(PCD) + \beta_3(ICD) + \mu$$

Where  $FV_{it}$ : Firm's value as measured by enterprise value for a particular listed service firm in year t.

EVTA: Market value of Debt + Market value of Equity + Minority interest – Cash – investment divided by Total Asset

STCD<sub>it</sub>: Firms' structural capital disclosure in year t



OCD<sub>it</sub>: Firms' organisational capital disclosure in year t  
 PCD<sub>it</sub>: Firms' process capital disclosure in year t  
 ICD<sub>it</sub>: Firms' innovation capital disclosure in year t

The coefficients of organisational, process, and innovation capital disclosure are represented by β1, β2, and β3, with β0 being the constant.

μ: Error term.

Based on the literature research and the hypotheses employed in the investigation, it is anticipated that β1, β2, and β3 will all be bigger than zero.

$$\text{Index} = (\sum \text{score} / \text{TN}) \times 100$$

Where: Index for different dimensions equals the structural capital disclosure index (SCD Index);

Score 5: if financial or quantitative information about the SCD is revealed along with a narrative;

Score 4: if just quantitative or monetary information about the SCD is provided, without any explanation;

Score 3: if narrative disclosure of SCD knowledge is made;

Score 2: when SCD material is shown, discussed, and only briefly provided while talking about other material, with little or no references made;

Score 1: if the business claims that it doesn't matter whether SCD elements are disclosed;

Score 0: If no SCD information is revealed.

TN stands for the total number of measured items (74 items).

**Table 1. Firms' value**

| Variables    | Description  | Measurement  | Source       |
|--------------|--|--|--------------|
| Firms' value | Enterprise value is the market capitalization plus short-term and long-term debt minus any cash divided by total assets. | Calculated as: (Market value of Debt + Market value of Equity + Minority interest – Cash – investment)/Total Asset | Jason (2022) |

Source: Author's Compilation, (2024)

**Table 2. Organisational capital components, score, disclosure index**

| Intellectual Capital Components | Items                         | Score        | Disclosure Index   |
|---------------------------------|-------------------------------|--------------|--|
| OCD                             | Mission statement             | P31 ∈ (5, 0) | $\text{OCD} = \frac{\text{P32} + \text{P33} + \text{P34} + \text{P35} + \text{P36} + \text{P37} + \text{P38} + \text{P39}}{9}$ |
|                                 | work culture and values       | P32 ∈ (5, 0) |  |
|                                 | company policy                | P33 ∈ (5, 0) |  |
|                                 | capital structure             | P34 ∈ (5, 0) |  |
|                                 | organisational chart          | P35 ∈ (5, 0) |  |
|                                 | Board structure               | P36 ∈ (5, 0) |  |
|                                 | organisational infrastructure | P37 ∈ (5, 0) |  |
|                                 | governance                    | P38 ∈ (5, 0) |  |
|                                 | technology infrastructure     | P39 ∈ (5, 0) |  |

Source: Angelini et al. (2019), Heryana et al. (2020) and Endah, (2020)

**Table 3. Process capital components, score, disclosure index**

| Intellectual Capital Components | Items                            | Score        | Disclosure Index  |
|---------------------------------|----------------------------------|--------------|---|
| PCD                             | Corporate Culture                | P40 ∈ (5, 0) | $\text{PCD} = \frac{\text{P40} + \text{P41} + \text{P42} + \text{P43} + \text{P44} + \text{P45} + \text{P46} + \text{P47} + \text{P48}}{9}$ |
|                                 | Information Systems (Technology) | P41 ∈ (5, 0) |   |
|                                 | Financial Relations              | P42 ∈ (5, 0) |   |
|                                 | Business Collaboration           | P43 ∈ (5, 0) |   |
|                                 | Favourable contracts             | P44 ∈ (5, 0) |   |
|                                 | Organization flexibility         | P45 ∈ (5, 0) |   |
|                                 | Organization learning            | P46 ∈ (5, 0) |   |
|                                 | Quality management               | P47 ∈ (5, 0) |   |
|                                 | business procedure               | P48 ∈ (5, 0) |   |

Source: Angelini et al. (2019), Heryana et al. (2020) and Endah, (2020)

**Table 4. Innovational capital components, score, disclosure index**

| Intellectual Capital Components | Items                    | Score        | Disclosure Index   |
|---------------------------------|--------------------------|--------------|--|
| ICD                             | Research and Development | P49 ∈ (5, 0) | $ICD = \frac{P49 + P50 + P51 + P52 + P53 + P54 + P55 + P56 + P57 + P58}{10}$ |
|                                 | Brands                   | P50 ∈ (5, 0) |  |
|                                 | Knowledge-based          | P51 ∈ (5, 0) |  |
|                                 | Research collaboration   | P52 ∈ (5, 0) |  |
|                                 | Goodwill                 | P53 ∈ (5, 0) |  |
|                                 | Patent                   | P54 ∈ (5, 0) |  |
|                                 | Copyright                | P55 ∈ (5, 0) |  |
|                                 | Trademarks               | P56 ∈ (5, 0) |  |
|                                 | Licenses                 | P57 ∈ (5, 0) |  |
|                                 | Commercial rights        | P58 ∈ (5, 0) |  |

Source: Angelini et al. (2019), Heryana et al. (2020) and Endah, (2020)

#### 4. DATA ANALYSIS AND DISCUSSION OF FINDINGS

The data analysis from the firms’ financial statements and other pertinent documents from the Nigerian Exchange Group (NGX) is presented in this chapter.

##### 4.1 Descriptive Statistics

The firm value as represented by enterprise value to asset ratio (EVTA) was 0.924532 with a median of 0.800396. The data ranges from 0.0000 to 5.148235. With a standard deviation of 0.829043, each data point differs from the mean by an average of 82.90%. The variability was extremely high. The dataset’s skewness of 1.839857 indicates a positively skewed shape. The kurtosis is 7.714633, showing leptokurtic distribution. The Jarque-Bera test was used to determine whether the sample data followed a normal distribution or not. The results of this test showed that the EVTA distribution varied significantly from the normal distribution (t-statistic = 445.6105, p-value = 0.0000).

The mean value of organisational capital disclosure (OCD) was 1.031215. The maximum number of items disclosed was 2.6667, while the minimum was 0.0000. The score has a standard deviation of 0.782938, showing relatively little variance among the data. The skewness was -0.049431, indicating that the distribution is slightly left-skewed. Kurtosis was 1.708157, indicating that most of the data distribution will fall on the right side of the mean. The Jarque-Bera statistic was 20.91296, with a probability of 0.000029. This indicates that the distribution was not normal.

The average size of the process capital disclosure (PCD) was 0.532887. PCD values vary from 0 to 2.11111. The standard deviation was 0.521259, showing that the observations differed slightly from the mean. The skewness of this distribution was 0.787634, indicating a right-skewed distribution. The kurtosis was 2.669174, which indicates a platykurtic distribution. The Jarque-Bera test statistic for a normal distribution was 32.27849, with a p-value of 0.000. This p-value is less than the significance level of 5%, suggesting that the data does not follow a normal distribution.

Furthermore, the innovation capital disclosure (ICD) mean was 0.498514 in size. These observational values, which corresponded to the minimum and maximum values, ranged from 0 to 2.2. Deviations from the mean on the standard were 0.485675. This suggested a minimal fluctuation. With skewness and kurtosis of 0.709187 and 2.822585, respectively, the distribution is both platykurtic and right-skewed. With a p-value of 0.000003, the Jarque-Bera test statistic for normal distribution was 25.45562, indicating the lack of normality.

##### 4.2 Panel Unit Root Test (Stationary Test)

The results of the panel unit root test, which are displayed in Table 6, indicated whether or not each panel variable was stationary. The Harris-Tzavalis test statistics were used to administer the test. Consequently, the series is not stationary if the p-value is less than 0.05. The p-values in this instance for EVTA, OCD, PCD, and ICD were 0.0000, respectively. This implied that the variables had no trend over time and had a constant mean, standard deviation, and finite variance.

**Table 5. Descriptive statistics**

| Parameter   | EVTA     | OCD       | PCD      | ICD      |
|-------------|----------|-----------|----------|----------|
| Mean        | 0.924532 | 1.031215  | 0.532887 | 0.498514 |
| Median      | 0.800396 | 1.111111  | 0.444444 | 0.500000 |
| Maximum     | 5.148235 | 2.666667  | 2.111111 | 2.200000 |
| Minimum     | 0.000000 | 0.000000  | 0.000000 | 0.000000 |
| Std. Dev.   | 0.829043 | 0.782938  | 0.521259 | 0.485675 |
| Skewness    | 1.839857 | -0.049431 | 0.787634 | 0.709187 |
| Kurtosis    | 7.714633 | 1.708157  | 2.669174 | 2.822585 |
| Jarque-Bera | 445.6105 | 20.91296  | 32.27849 | 25.45562 |
| Probability | 0.000000 | 0.000029  | 0.000000 | 0.000003 |
| Sum         | 276.4351 | 308.3333  | 159.3333 | 149.0556 |
| Sq. Dev.    | 204.8190 | 182.6716  | 80.96982 | 70.29243 |
| Obs         | 299      | 299       | 299      | 299      |

Sources: Researcher's Computation, (2023)

**Table 6. Panel unit root test**

| Variables | Harris-Tzavalis |         | Breitung  |         |
|-----------|-----------------|---------|-----------|---------|
|           | Statistic       | p-value | statistic | p-value |
| EVTA      | -6.6641         | 0.0000  | -0.3590   | 0.3598  |
| OCD       | -5.4850         | 0.0000  | -1.3240   | 0.9270  |
| PCD       | -8.1286         | 0.0000  | -0.9992   | 0.1598  |
| ICD       | -4.9869         | 0.0000  | -1.2306   | 0.1092  |

Sources: Researcher's Computation, (2023)

### 4.3 The Effect of Structural Capital Disclosure on Listed Service Firms' Value in Nigeria

#### 4.3.1 Correlation analysis

The relationship between a variable's current values and its historical values is measured via serial correlation. The purpose of this was to find any linear correlations or dependencies between the independent variables. This study's results, which are displayed in Table 7, suggest that OCD and PCD have a somewhat substantial positive connection (0.7297). OCD and ICD have a somewhat positive connection (0.4232). A moderately strong association (0.5289) was also

found between PCD and ICD. Ultimately, the data demonstrated that the independent variables exhibited a majority of somewhat positive significant associations.

#### 4.3.2 Variance inflation factors

To analyse the type of relationship that exists between the independent variables, the study used a variance inflation factor (VIF). VIF coefficient estimates demonstrate the linear reliance on the model's independent variables. The VIF values for the PCD, OCD, and ICD variables were 3.26, 2.94, and 1.65, respectively, which were significantly below the threshold of 10. This indicates that there is no substantial multiple correlation in the model.

**Table 7. Correlation analysis**

| Correlation Probability | OCD    | PCD    | ICD |
|-------------------------|--------|--------|-----|
| OCD                     | 1      |        |     |
| PCD                     | 0.7297 | 1      |     |
| ICD                     | 0.4232 | 0.5289 | 1   |
|                         | 0      | 0      | 0   |

Sources: Researcher's Computation, (2023)

**Table 8. Variance inflation factors**

| Variable | VIF  | 1/VIF    |
|----------|------|----------|
| PCD      | 2.45 | 0.408519 |
| OCD      | 2.15 | 0.465553 |
| ICD      | 1.39 | 0.717323 |

Sources: Researcher's Computation, (2023)

**Table 9. Regression estimate on effect of structural capital disclosure on firms' value**

| Variables                   | Pooled OLS              |         |         | Fixed Effect |         |         | Random Effect |         |         |
|-----------------------------|-------------------------|---------|---------|--------------|---------|---------|---------------|---------|---------|
|                             | Coeff                   | t-value | p-value | Coeff        | t-value | p-value | Coeff         | t-value | p-value |
| OCD                         | 0.452924                | 4.99    | 0.000   | 0.1280585    | 0.83    | 0.414   | 0.158192      | 1.06    | 0.289   |
| PCD                         | -0.5338637              | -3.47   | 0.001   | -0.102375    | -0.52   | 0.610   | -0.14199      | -0.83   | 0.408   |
| ICD                         | 0.4082284               | 3.48    | 0.001   | 0.4000411    | 1.53    | 0.141   | 0.393512      | 1.44    | 0.150   |
| Constant                    | 0.5050731               | 6.69    | 0.000   | 0.6476045    | 7.97    | 0.000   | 0.640898      | 4.60    | 0.000   |
| R-squared                   | 0.1549                  |         |         | 0.1209       |         |         | 0.1286        |         |         |
| Adj. R-squared              | 0.1463                  |         |         | 0.0977       |         |         | 0.0974        |         |         |
| F-statistic                 | 18.02                   |         |         | 3.89         |         |         | 12.58         |         |         |
| Probability                 | 0.000                   |         |         | 0.0227       |         |         | 0.0056        |         |         |
| Hausman test                | 10.32 (p-value=0.0160)  |         |         |              |         |         |               |         |         |
| Panel Wooldridge test       | 8.061(p-value=0.0095)   |         |         |              |         |         |               |         |         |
| Wald Test                   | 9540.48(p-value=0.0000) |         |         |              |         |         |               |         |         |
| Redundant fixed effect test | 19.97(p-value=0.0000)   |         |         |              |         |         |               |         |         |
| Lagrange Multiplier Tests   | 543.67(p-value=0.0000)  |         |         |              |         |         |               |         |         |

Source: Author's computation, (2023)

**Table 10. GLS estimate on effect of structural capital disclosure on firms' value**

| Variables    | Generalized Least squares |         |         |
|--------------|---------------------------|---------|---------|
|              | Coeff                     | t-value | p-value |
| OCD          | 0.189174                  | 5.02    | 0.000   |
| PCD          | -0.1044028                | -0.91   | 0.056   |
| ICD          | 0.3293951                 | 4.75    | 0.000   |
| Constant     | 0.622737                  | 13.63   | 0.000   |
| Wald Chi2(3) | 130.81                    |         |         |
| Probability  | 0.0000                    |         |         |

Source: Author's computation, (2023)

### 4.3.3 The Effect of structural capital disclosure on listed service firms' Value in Nigeria

The redundant fixed effect test was used to compare the efficiency of the pooled ordinary least squares model to the fixed effects model. The test statistic of 19.97 and p-value of 0.0000 suggest that the fixed effect model was more acceptable. In addition, the fixed effect and random effect models were evaluated for robustness. The Hausman test yielded a t-statistic of 10.32 and a p-value of 0.0160, showing that fixed effects are more efficient. Breusch and Pagan's Lagrangian multiplier test for random effects yielded a result of 543.67 with a p-value of 0.0000, indicating that the random effect model is more appropriate than the Pooled OLS.

However, the Wald test for groupwise heteroskedasticity was used to assess heteroskedasticity in error terms. Significant test statistics suggest that the residuals are homoskedastic, otherwise heteroskedastic. In Table 8, the test result is 9540.48, with a p-value of 0.0000. This suggests that the data is heteroskedastic. Autocorrelation was also tested using the Wooldridge autocorrelation test. The results show a value of 8.061 with a p-value of 0.0095. This demonstrated that the independent variables were serially correlated. Based on this, the study performed Generalised Least Squares regression with linked disturbance.

The Wald test statistic result of 130.81 with a p-value of 0.0000 indicates that the predictors accurately predict the target variable. As reported in Table 8, the OCD coefficient is 0.189174. This means that for every unit increase in OCD disclosure, the EVTA increases by approximately 18.9174 per cent. Additionally, the PCD coefficient is -0.1044028. This indicates that for every unit increase in PCD volume, the value of EVTA decreases by 10.44028%. The ICD coefficient is 0.3293951, which means that each unit increase in ICD volume results in a 32.93951% rise in EVTA. OCD and ICD have p-values of 0.000, whereas PCD has a p-value of 0.056. OCD and ICD have a statistically significant effect on EVTA, whereas PCD has a moderately significant effect on EVTA.

### 4.4 Discussion

This study evaluates the impact of structural capital disclosure on a firm's value in Nigeria.

According to the study's findings, the amount of disclosure was low, with the highest quality score among the studied organisations being 26.67% and the lowest being non-disclosure. This is far below the average. The medium of such disclosure was the narrative form offered in the chairman's and director's reports, as well as the notes to the financial statements, with nothing found in the financial statements. Organisational capital was the most mentioned item. More than 70% of businesses did not publish information about process capital [48]. This was widely predicted, as there is no framework or norms for such disclosure in the financial statements.

However, this study discovered that there were strong positive connections between firm value and organisational and innovation capital, whereas process capital had a negative negligible relationship. This was consistent with research undertaken by Tran and Vo [94], Li et al. [62], and Ocak and Findik [74]. This was also expected, given that corporations have historically been hesitant to reveal additional information about their process capital due to its associated cost. These costs called "competitive disadvantage costs" need to be considered as competitors can use such disclosure to the firm's disadvantage. In agreement with this, Roslender and Monk [83] stated that the difference between product, market competition and the threat of entry has been a factor on voluntary disclosures.

## 5. CONCLUSION AND RECOMMENDATIONS

The study used multiple regression and correlation analysis to assess the impact of structural capital disclosure on Nigerian listed service organisations. According to the study's findings, structural capital disclosure proxy by organisational, process, and innovation capital has a substantial influence on the value of listed service organisations in Nigeria. This implied that the more structural capital dimensions are disclosed, the greater the influence on business value, whether favourably. Given this finding, the study suggests that a framework for such disclosure be institutionalised, as organisations prefer to limit this type of disclosure due to business secrecy and competitive disadvantage costs.

### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models

(ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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