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MANDATORY AND VOLUNTARY SEGMENT DISCLOSURES OF LISTED COMPANIES IN NIGERIA: A RECURSIVE TRANSITION MATRIX ANALYSIS

Abstract

Mandatory and voluntary segment disclosure is crucial for shareholders to assess a firm's financial health and make informed investment decisions. Given the importance of disclosure to investors, this study investigates the extent of voluntary and mandatory segment disclosure of listed companies in Nigeria from 2015 to 2022. Using descriptive analysis, specifically a recursive transition matrix approach, this study tracked yearly changes in mandatory and voluntary segment disclosure for 85 companies listed on the Nigerian Exchange Group. The findings revealed that mandatory segment disclosure has a mean score of 11.3, which is notably higher than the mean score of 6.86 for voluntary segment disclosure. Also, the recursive transition matrix revealed a notable increase in companies transitioning from lower to higher levels of mandatory segment disclosures. For instance, 87.5% of companies were at Level 1 (Low-level disclosure) in 2016, but this dropped to 35.4% by 2022, showing a shift to higher levels. Levels L2, L3, and L4 remained relatively stable, indicating sustained improvements. This trend reflects the impact of regulatory changes on the increased transparency of companies in Nigeria. For voluntary segment disclosures, in 2016, 72.5% of companies were at L1, 25% moved to L2, and 2.5% advanced to L3. By 2022, the percentages were 41.1% at L1, 34% at L2, and 24.9% at L3. Although some companies have progressed, many continue to maintain low levels of voluntary segment disclosure. The study concluded that listed companies in Nigeria need to improve their voluntary segment disclosures to enhance transparency and address investors' concerns about inadequate segment disclosure practices among firms.

Keywords

business segments, geographic segments, proprietary cost, agency theory, disclosure practices

JEL Classification

M41, M14, M40

INTRODUCTION

The introduction of segment disclosure under International Financial Reporting Standard 8 (IFRS 8) was designed to enhance transparency in corporate reporting, boost investors' confidence, and improve global comparability of financial statements. Over time, IFRS 8 (mandatory disclosure) has transformed segment reporting by requiring entities to provide information based on the management approach in companies. Segment disclosure according to the management approach entails disclosing operating segment information reported to the chief operating decision maker of a firm. By mandating companies to provide detailed information about their operating segments – both business and geographic – IFRS 8 aimed to address the previous practice of inadequate segment reporting. In addition to mandatory disclosure, researchers, analysts, and investors have demanded voluntary disclosure to provide additional information to stakeholders on the areas not covered by IFRS 8.



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Conflict of interest statement:

Author(s) reported no conflict of interest

Despite these advancements, concerns over inadequate segment disclosure practices of firms persist globally (Kobbi-Fakhfakh, et al., 2019; Chichernea et al., 2024). For instance, the delisting of multiple companies in Nigeria, such as Alumaco Plc, Costain Plc, and Jos International Breweries Plc from the Nigerian Exchange Group (NGX), underscores the ongoing challenges in disclosure practices among listed companies in Nigeria (Bello, 2016; Opara, 2017). In response to these challenges, listed companies in Nigeria were required to adopt IFRS 8 in 2013. Since then, studies have investigated the extent of segment disclosures mandated by IFRS 8, while some have investigated the extent of voluntary segment disclosure based on companies' discretion. However, there remains a significant gap regarding the evolving levels of voluntary and mandatory segment disclosure over time, especially in Nigeria.

1. LITERATURE REVIEW

Segment disclosure can be either mandatory or voluntary disclosure of information about the various geographic and business segments of a company. Companies disclose mandatory segment information to comply with legal requirements (Berger & Hann, 2003; Le et al., 2022) while providing voluntary segment information to provide additional information to shareholders regarding their activities (Hail, 2000; Gietzmann & Ireland, 2005; Tian & Chen, 2009). Mandatory segment disclosure requirements have evolved over time to improve the informativeness of segment data for investors' benefits. Over time, standards like SFAS 14, IAS 14, SFAS 131, and IFRS 8 have evolved, each addressing the deficiencies of its predecessors. International Financial Reporting Standard 8 (IFRS 8), which is the most recent standard, ensures companies promote transparency by disclosing relevant segment information to shareholders (Botosan, 2000; Berger & Hann, 2003; Andre et al., 2016; Cereola, & Dynowska, 2022).

IFRS 8, which details disclosure requirements for operating segments, has changed the landscape of segment reporting globally. This is because this standard mandates companies to provide information to stakeholders about the financial and non-financial status of their business and geographic segments. Studies focusing on the value relevance of segment disclosure reveal that higher-quality segment disclosure increases the overall financial reporting transparency of companies thereby enhancing the decision-making capabilities of investors and (Cho, 2015; Aboud et al., 2018). In addition, it reduces adverse selection costs in companies and minimizes information asymmetry between companies and outside capital providers. Furthermore, segment disclosure encourages greater foreign in-

vestment and reduces the home bias of investors, as they can easily evaluate investment opportunities globally (Peleaz, 2010). Also, the provision of segment information aids analysts in making more accurate earnings forecasts (Lang & Lundholm, 1993; Heo & Doo, 2018). This is possible because segment disclosure disaggregates financial information within companies' financial statements, providing stakeholders with insights into segment performance that facilitates monitoring and risk-return analysis (Botosan & Stanford, 2005; Hope et al., 2009; Elsayed et al., 2019). Thus, this transparency mitigates the risk of managers obscuring poor-performing segments by integrating them with profitable ones, thereby narrowing the information gap between management and investors.

Initially, researchers have primarily shown interest in discussing mandatory segment disclosure. However, further research indicates that mandatory disclosure might not fully capture all the aspects of a firm's activities (Bens et al., 2011; Ibrahim, 2014). This concern led to studies on the important role of voluntary segment disclosure in providing additional insights beyond legal requirements to address the concern of investors regarding inadequate segment disclosure (Botosan, 1997; Hollie, 2015; Andre et al., 2016). This is because inadequate segment disclosure leads to information asymmetry, higher transaction costs in the securities market, and potential litigation (Botosan, 1997; Healy et al., 1999). Furthermore, some studies asserted that inadequate disclosure deprives investors of information needed for decision-making and assessing risks and returns associated with each segment (Tian & Chen, 2009; Blanco et al., 2015). Other studies show that inadequate segment information deprives analysts of the necessary information for making accurate earnings forecasts (Lang & Lundholm, 1993; Heo & Doo, 2018).

Given these challenges, research into the extent of mandatory and voluntary disclosure remains dynamic and conflicting. Some studies have shown that segment disclosure has a negative and significant effect on information asymmetry in corporate relations (Botosan, 2000; Botosan & Stanford, 2005). Another strand of the literature shows that the main advantage of IFRS 8, which mandates and disaggregates segment information, is that it provides shareholders with access to the same internal management information that is utilized for resource allocation among different segments (Mateescu, 2016; Mutalib & Jaafar, 2019). In line with this argument, research has shown that disaggregated segment disclosure is beneficial as it increases implicit incentives for managers to allocate resources as desired by shareholders (Elsayed et al., 2019; Atika et al., 2023). This transparency approach aids in monitoring managerial performance and analyzing risks and returns across segments (Botosan & Stanford, 2005; Hope & Thomas, 2008; Elsayed et al., 2019). Also, such clarity helps to prevent managers from masking failing segments by combining them with more profitable ones, which consequently reduces information asymmetry between managers and investors.

The analysis of mandatory and voluntary segment disclosure of companies has been anchored on different theoretical frameworks. The information asymmetry theory posits that the extent of segment disclosure is primarily determined by managers of companies, as they can choose to divulge or withhold information from shareholders (Akerlof, 1995; Botosan & Stanford, 2005). In addition, signaling theory determines the extent of information provided by managers in an organization. According to Gisbert et al. (2024), signaling is a deliberate move by managers of companies to disclose information to send a signal to investors about future investment. Agency theory was documented by researchers as one of the fundamental theories that determine the extent of voluntary segment disclosure because misalignment of interest between managers and investors can impact the disclosure of voluntary segment information, especially when managers fail to advance the interests of investors (Berger & Hann, 2007). Furthermore, studies have shown that proprietary cost theory is another determinant of segment disclosure. This is because the cost and benefits

of disclosure are constantly weighed by managers due to competitive disadvantages (Prencipe, 2004; Lang & Sul, 2014).

In recent years, researchers have increasingly recognized that the quality and extent of segment disclosures – both voluntary and mandatory – are shaped by a variety of factors that extend beyond the established disclosure theories. Studies have shown that the variability in segment disclosure practices among multi-segment companies can be attributed to several influences, including firm size, degree of internationalization, industry characteristics, profitability, regulatory environment, ownership structure, and auditor influence (Wang, 2015; Mateescu, 2016; Mutalib & Jaafar, 2019). For instance, it has been established in the literature that larger companies tend to disclose more segment information than smaller companies, which may likely be a response to heightened scrutiny from investors and analysts (Andre et al., 2016; Mutalib & Jafar, 2019). In contrast, smaller companies with a significant proportion of profitable segments in concentrated and smaller industries may tend to limit their voluntary disclosures to avoid competitive disadvantages or increased proprietary costs (Shivaani & Agarwal, 2020; Xiong & Yang, 2021).

Aside from the size factor, profitability is another factor that influences the extent of segment disclosure as Mardini et al. (2013) documented that profitable companies tend to strategically withhold information to maintain their competitive advantage. Furthermore, studies have shown that companies with higher levels of diversification are more inclined to offer additional voluntary segment disclosure (Bens et al., 2011; Becerra & Santalo, 2006). Factors such as leverage, and ownership structure also play critical roles in determining the extent of segment disclosures. For instance, higher leverage has been found to influence disclosure levels (Mardini et al., 2013). Companies with dispersed ownership have been found to disclose more segment information to address agency costs and the informational needs of a broader shareholder base (Domínguez, 2012). In contrast, empirical findings revealed that companies with concentrated ownership may have less incentive to provide extensive disclosures, as principal owners typically have direct access to management (Bhimavarapu et al., 2023; Munisi, 2023).

Despite the vast number of studies on voluntary and mandatory segment disclosures around the world (Alfaraih & Alanezi, 2011; Andre et al., 2016), there remains a gap in terms of the year-by-year transition between voluntary and mandatory disclosure levels by listed companies in Nigeria. In addressing this gap, this study analyses the extent of mandatory and voluntary segment disclosure of listed companies in Nigeria, utilizing a recursive transition matrix. The transition matrix is pivotal in various mathematical and financial contexts, demonstrating its versatility across different fields. For example, Yevick and Reimer (2007) applied the transition matrix to analyze outage times in optical fiber systems affected by polarization-mode dispersion. In the medical line, Loslever et al. (2009) utilized multiple transition matrices to explore time-dependent data, showcasing its effectiveness in analyzing eye movement patterns. Similarly, Yu and Chen (2000) investigated transitions between DNA base types using transition matrices, emphasizing the importance of complexity measures based on transition proportion matrices.

In the field of accounting, Cohen (2002) reported on multiplier analysis using Social Accounting Matrices (SAM) and found that growth multipliers in China surpass those in Russia. Similarly, Ferrari et al. (2021) employed a detailed 2015 Social Accounting Matrix for China, spanning 19 industries to identify endogenous and exogenous accounts. Additionally, Busu et al. (2023) examined investment dynamics' impact on global productivity using the Leontief matrix as an analytical tool. Given the suitability of the recursive transition matrix in analyzing evolving data sets, this study applied it to the understanding of how listed companies in Nigeria transitioned from one segment disclosure level to another to know if companies are decreasing or increasing their segment information dissemination to stakeholders.

Although existing research has explored the scope of segment disclosures, there remains a gap in the understanding of how companies adjust their disclosure practices over time. This issue is especially pressing in Nigeria, where there have been significant concerns from investors and other stakeholders regarding insufficient disclosure practices. Addressing this gap could provide valuable

insights into how companies can improve their transparency and better serve the needs of their stakeholders.

Therefore, this study tracked yearly changes in both mandatory and voluntary segment disclosure by listed companies in Nigeria to assess whether they are increasing or decreasing the level of segment information shared with stakeholders.

2. METHOD

This study sampled 85 listed companies on the Nigerian Exchange Group (NGX), with secondary data extracted from these companies' annual reports from 2015 to 2022. The selection of these 85 companies from a total population of 135 companies was based on purposive sampling, focusing on geographic and business segment information, as well as companies with consistent share trading on the NGX during the sampled period. This study employed descriptive statistics in the analysis of the transition of companies between different segment disclosure levels using a recursive transition matrix. This method was chosen due to its ability to effectively analyze time-series data (2015-2022) that exhibits Markov dependency.

In addition, the extent of segment disclosure by companies was assessed through the identification of both mandatory and voluntary segment information disclosed by the examined companies. The mandatory aspect of disclosure was based on the segment reporting obligations stipulated in IFRS 8, while the voluntary aspect is the additional segment information disclosed by companies in their financial reports. So, the final disclosure list is a combination of the checklists from the mandatory and voluntary disclosure index.

The study adopted a total disclosure checklist containing 42 questions from the disclosure indices built by Mardini et. al. (2013) and Peleaz (2010). The score was measured over 42 questions with a binary coding scheme at the availability of a disclosure item. Each disclosed item receives a score of 1, while items not disclosed receive a score of 0. Therefore, when an item appears in a firm's annual report, it is assigned a value of 1; otherwise, it receives a value of 0. The three stages of disclosure for assessing the extent of segment disclosure are:

- Mandatory Segment Disclosure (MSD)
- Voluntary Segment Disclosure (VSD)
- Total Segment Disclosure (TSD)

The firm's disclosure score was calculated by summing the scores of all items and dividing the result by the total number of the items in the disclosure index: For each item, MSD, VSD, and TSD = 1, indicating disclosure, and 0 otherwise. Let n represent the total number of applicable items for a firm, comprising z mandatory items and p voluntary items of segmental information provided annually. This breakdown provides an analysis of the extent of mandatory and voluntary segments disseminated by the examined companies, consequently resulting in the total segment disclosure (TSD) for each firm.

$$MSD = \sum_{i=1}^m \frac{msd_i}{z} \quad (1)$$

$$VSD = \sum_{i=1}^p \frac{vsd_i}{p} \quad (2)$$

$$TSD = \sum_{i=1}^n \frac{tsd_i}{n} \quad (3)$$

Following the computation of the extent of the segment disclosure by employing the above method, a transition matrix was used to explain the movement of companies from one disclosure level to another. The transition matrix is considered appropriate in evolving data sets, and in this circumstance, it explains the extent of segment disclosure as it captures the movement of companies from one disclosure level to another. Transitions between these periods occur from time $t+1$ and are typically documented in a $k \times k$ transition matrix. Determining the extent of segment disclosure involves selecting the appropriate method to summarize the total scope of the companies' movement across the observed years into a single real number.

3. RESULTS AND DISCUSSION

Table 1 displays the descriptive statistics of the extent of segment disclosure of listed companies in Nigeria, based on the score attributable to compa-

nies under mandatory, voluntary, and total segment disclosure. The total number of mandatory segment disclosure items used to assess the extent of companies' mandatory disclosure in the study is 16. The average mandatory disclosure score of companies as seen in Table 1 is 11.33, the minimum is 9, and the maximum is 15. This implies that many of these companies disclosed sufficient mandatory segment information in their annual report. The minimum score being 9 is still above average given the total mandatory segment disclosure index of 16. This implies that the companies generally provide adequate mandatory segment information, with a mean score of 11.3. This is due to the requirement for companies to disclose mandatory segment information in their annual reports, as outlined by the International Financial Reporting Standards (IFRS).

Also, the total voluntary disclosure index used to assess the extent of voluntary segment disclosure by the companies consists of 26 disclosure items. Based on the descriptive results in Table 1, it is evident that the voluntary segment disclosure level of companies is very low, given the mean voluntary segment disclosure of 6.86 items, minimum score of 3 items, and maximum score of 9 items. In contrast to mandatory disclosure, voluntary segment disclosure remains notably low, with a mean score of 6.86. This disparity stems from the lack of obligation to provide voluntary disclosures, leaving such decisions largely to the discretion of management. This finds support in the studies by Botosan (2000) and Blanco et al. (2015).

Table 1. Descriptive statistics of firms' mandatory, voluntary, and total segment disclosures

	MSD	VSD	TSD
Mean	11.32	6.86	18.19
Median	11.00	7.00	18.00
Maximum	15.00	9.00	24.00
Minimum	9.00	3.00	12.00
Std. Dev.	2.09	1.33	2.28
Skewness	0.45	0.07	0.45
Kurtosis	1.92	2.76	2.76
Jarque-Bera	55.49	2.19	24.80
Probability	0.00	0.33	0.0004
Sum	7701.00	4665.00	12366.00
Sum Sq. Dev.	2961.18	1187.73	3538.65

Note: The table shows the mean, median, minimum, maximum, and Standard deviation reports of the observed firms. MSD = Mandatory Segment Disclosure, VSD = Voluntary Segment Disclosure, TSD = Total Segment Disclosure.

Table 2 presents the transition matrix of mandatory segment disclosure of listed companies in Nigeria from 2015 to 2022. The aim was to assess whether companies increased or decreased their level of mandatory segment disclosure over time compared to their initial status in 2015. Table 2 classified disclosure levels into four categories (9-10 as level 1, 11-12 as level 2, 13-14 as level 3, and 15-16 as level 4) for easy comparison. This classification spans from the minimum mandatory disclosure score of 9 to the maximum score of 16, derived from the descriptive statistics in Table 1. In each year, companies were categorized into these disclosure levels, and transitions between levels from one year (t) to the next (t+1) were recorded. For instance, in 2016, out of the initial 85 companies, 28 remained at level 1 (L1/L1), 3 moved to level 2 (L1/L2), and 1 advanced to level 3 (L1/L3), with none reaching level 4. This indicated a predominant trend of companies maintaining moderate levels of disclosure.

Moving to 2017, 25 companies remain at level 1 (the moderate disclosure level, L1/L1). This indicates that some companies have transited to a higher level of disclosure, as 25 is less than the number reported to be in L1/L1 in 2016. Furthermore, 24 companies remained at level 2 (L2/L2), while others either fell to a lower level or a higher level. Still, in 2017, 10 companies transited to level 3 (L3/L3) while 5 transited to level 4 (L4/L4). The figures in the sum columns and rows represent the total number of companies that disclosed mandatory segment information for all levels. The last intersection in the sum section (SUM/SUM) where 85 companies were reported denotes the total number of companies at all levels. This, therefore, accounts for the total number of companies considered in the study.

In 2018, 22 companies remained at level 1 (the moderate disclosure level, L1/L1). This indicates that some companies have transited to a greater level of disclosure, as 22 is less than the number reported to be in L1/L1 in 2017. Furthermore, 21 companies remain at level 2 (L2/L2), while others either fell to a lower level or a higher level. Still, in 2018, 8 companies transited to level 3 (L3/L3) while 7 transited to level 4 (L4/L4). The number of companies with higher disclosure levels in 2018 increased by two companies compared to 2017.

In 2019, 19 companies remained in level 1 (the moderate disclosure level, L1/L1). This indicates that some companies have transited to a higher level of disclosure as the number in the lower disclosure level is gradually reducing as the years progress. This implies that companies' level of mandatory segment disclosure increased over the years. This is evident from the number of companies at this level in 2019(19), as against that of 2016(28), 2017(25), and 2018(22). In addition, 20 companies remain in level 2 (L2/L2), while others either fell to a lower level or a higher level. Still in 2019, 9 companies transited to level 3 (L3/L3) while 6 transited to level 4 (L4/L4).

Proceeding to 2020, 17 companies remain in level 1 (the moderate disclosure level, L1/L1). Also, this indicates that some companies have transited to a greater level of disclosure as the number in the lower disclosure level is gradually reducing compared to the preceding years. This implies that companies' level of mandatory segment disclosure increased over the years. This is evident from the number of companies at this level in 2020(17), as against that of 2016(28), 2017(25), and 2018(22), 2019(19). In addition, 17 companies remain at level 2 (L2/L2), while others either fell to a lower level or a higher level. Still in 2020, 8 companies transited to level 3 (L3/L3) while 4 companies transited to level 4 (L4/L4). In subsequent years, results showed that a significant portion of companies transited to a higher disclosure level, while a smaller percentage remained at the lower level (L1). The findings reflect a shift towards higher mandatory disclosure levels in Nigeria as the examined companies not only advanced to higher levels but also sustained these improvements. These findings highlight the impact of regulatory changes and the growing emphasis on transparency and detailed segment disclosures, and it is corroborated in the work of Elsayer et al. (2019).

Table 3 presents a detailed analysis of companies' transitions across different levels of voluntary segment disclosure. It consists of two panels: one detailing the absolute number of companies transitioning at each level, and the other providing the corresponding percentage breakdown. These panels are categorized into three distinct levels for clarity: Level 1 (L1): scores ranging from 0 to less than 7, Level 2 (L2): scores from 7 to less than 8,

Table 2. Transition matrix of extent of mandatory segment disclosure using the recursive method

Year	Panel 1						Panel 2				
	Count Proportion/Numbers of Firms in Transition						Transition Matrix of firms (%)				
	2015						2015				
		L1	L2	L3	L4	SUM		L1	L2	L3	L4
2016	L1	28	3	1	0	32	L1	87.5	9.4	3.1	0.0
	L2	2	27	4	0	33	L2	6.1	81.8	12.1	0.0
	L3	0	2	8	1	11	L3	0.0	18.2	72.7	9.1
	L4	0	0	0	9	9	L4	0.0	0.0	0.0	100.0
	SUM	30	32	13	10	85	LSP	0.0	0.0	0.0	100.0
2017	L1	25	4	2	0	31	L1	80.6	12.9	6.5	0.0
	L2	4	24	1	4	33	L2	12.1	72.7	3.0	12.1
	L3	0	4	10	1	15	L3	0.0	26.7	66.7	6.7
	L4	1	0	0	5	6	L4	16.7	0.0	0.0	83.3
	SUM	30	32	13	10	85	LSP	38.2	27.8	9.9	24.2
2018	L1	22	6	2	1	31	L1	71.0	19.4	6.5	3.2
	L2	6	21	3	1	31	L2	19.4	67.7	9.7	3.2
	L3	0	4	8	1	13	L3	0.0	30.8	61.5	7.7
	L4	2	1	0	7	10	L4	20.0	10.0	0.0	70.0
	SUM	30	32	13	10	85	LSP	34.0	38.8	15.5	11.8
2019	L1	19	7	3	1	30	L1	63.3	23.3	10.0	3.3
	L2	8	20	1	2	31	L2	25.8	64.5	3.2	6.5
	L3	0	4	9	1	14	L3	0.0	28.6	64.3	7.1
	L4	3	1	0	6	10	L4	30.0	10.0	0.0	60.0
	SUM	30	32	13	10	85	LSP	36.4	38.2	13.7	11.6
2020	L1	17	10	3	1	31	L1	54.8	32.3	9.7	3.2
	L2	8	17	1	5	31	L2	25.8	54.8	3.2	16.1
	L3	1	4	8	0	13	L3	7.7	30.8	61.5	0.0
	L4	4	1	1	4	10	L4	40.0	10.0	10.0	40.0
	SUM	30	32	13	10	85	LSP	34.9	37.9	15.1	12.1
2021	L1	14	12	4	1	31	L1	45.2	38.7	12.9	3.2
	L2	10	15	3	4	32	L2	31.3	46.9	9.4	12.5
	L3	1	4	6	1	12	L3	8.3	33.3	50.0	8.3
	L4	5	1	0	4	10	L4	50.0	10.0	0.0	40.0
	SUM	30	32	13	10	85	LSP	34.6	37.5	16.0	11.9
2022	L1	12	11	5	0	28	L1	42.9	39.3	17.9	0.0
	L2	11	16	1	6	34	L2	32.4	47.1	2.9	17.6
	L3	2	4	6	1	13	L3	15.4	30.8	46.2	7.7
	L4	5	1	1	3	10	L4	50.0	10.0	10.0	30.0
	SUM	30	32	13	10	85	LSP	35.4	37.6	15.9	11.2

Note: The table shows the transition matrix of the Extent of Mandatory Segment Disclosure from 2015 to 2022. L1 = Level 1, L2 = Level 2, L3 = Level 3, L4 = Level 4. SUM = sum of the numbers in the row and column, LSP = Long-Run Percentage.

and Level 3 (L3): scores greater than 8. This classification spans from the minimum voluntary disclosure score of 3 to the maximum score of 9, derived from descriptive statistics in Table 1.

Results revealed that out of the 85 companies that started out in 2015, 29 companies remained at level one (L1/L1) in 2016, 10 transited to the second level (L1/L2), only one (1) firm moved to the third level (L1/L3). This illustrates that all the companies are low voluntary segment disclosers since the maximum score is 9 compared to a total

voluntary disclosure score of 26. Still in 2016, the second disclosure level (L2) revealed that 15 companies (from 2015) remained at level 2 (L2/L2), while 4 retrogressed to the first level (L2/L1), and 5 companies moved to a higher level (L2/L3). For the third level in 2016, 15 companies started at L3/L3, 4 and 2 companies fell back.

Moving to 2017, 26 companies remain in level 1 (the moderate disclosure level, L1/L1). This indicates that some companies have transited to a better level of voluntary disclosure, as 26 is less

Table 3. Transition matrix of the extent of voluntary segment disclosure using the recursive method

Year	Panel 1					Panel 2			
	Numbers of Firms in Transition					Transition Matrix of firms (%)			
	2015					2015			
		L1	L2	L3	Sum		L1	L2	L3
2016	L1	29	10	1	40	S1	72.5	25.0	2.5
	L2	4	15	5	24	S2	16.7	62.5	20.8
	L3	2	4	15	21	S3	9.5	19.0	71.4
	Sum	35	29	21	85	LSP	32.9	37.1	30.0
2017	L1	26	11	0	37	S1	70.3	29.7	0.0
	L2	5	14	13	32	S2	15.6	43.8	40.6
	L3	4	4	8	16	S3	25.0	25.0	50.0
	Sum	35	29	21	85	LSP	40.0	33.1	26.9
2018	L1	16	11	1	28	S1	57.1	39.3	3.6
	L2	7	17	11	35	S2	20.0	48.6	31.4
	L3	12	1	9	22	S3	54.5	4.5	40.9
	Sum	35	29	21	85	LSP	43.5	35.1	21.3
2019	L1	16	14	3	33	S1	48.5	42.4	9.1
	L2	5	14	13	32	S2	15.6	43.8	40.6
	L3	14	1	5	20	S3	70.0	5.0	25.0
	Sum	35	29	21	85	LSP	42.4	34.1	23.6
2020	L1	13	14	1	28	S1	46.4	50.0	3.6
	L2	7	13	15	35	S2	20.0	37.1	42.9
	L3	15	2	5	22	S3	68.2	9.1	22.7
	Sum	35	29	21	85	LSP	41.6	36.3	22.1
2021	L1	12	16	10	38	S1	31.6	42.1	26.3
	L2	8	10	9	27	S2	29.6	37.0	33.3
	L3	15	3	2	20	S3	75.0	15.0	10.0
	Sum	35	29	21	85	LSP	41.6	33.7	24.7
2022	L1	11	16	10	37	S1	29.7	43.2	27.0
	L2	6	11	10	27	S2	22.2	40.7	37.0
	L3	18	2	1	21	S3	85.7	9.5	4.8
	Sum	35	29	21	85	LSP	41.1	34.0	24.9

Note: The table shows the transition matrix of the extent of voluntary segment disclosure from 2015 to 2022. L1 = Level 1, L2 = Level 2, L3 = Level 3, SUM = sum of the numbers in the row and column, LSP = Long-Run Percentage.

than the number reported to be in L1/L1 in 2016. Furthermore, 14 companies remain at level 2 (L2/L2), while others either fell to a lower level or a higher level. Still in 2017, 8 companies transitioned to level 3 (L3/L3). The figures in the sum columns and rows represent the total number of companies that disclosed mandatory segment information for all levels. The last intersection in the sum section (SUM/SUM) where 85 companies were reported denotes the total number of companies in all the levels. This, therefore, accounts for the total number of companies examined in the study.

In 2018, 16 companies remained at level 1, and this indicates that some companies have transitioned to a higher level of disclosure, as 16 is less than the number reported to be in L1/L1 in 2015.

Furthermore, 17 companies remained at level 2 (L2/L2), while others either fell to a lower level or a higher level. Still in 2018, 9 companies transitioned to level 3 (L3/L3). In subsequent years (2019, 2020, 2021), the observed companies only showed a slight improvement in the level of their voluntary segment disclosure. By 2022, the long-term percentages showed 41.1% of companies at L1, 34% at L2, and 24.9% at L3, implying that voluntary segment disclosure is still very low in listed companies in Nigeria. This indicates that while some companies are making progress, a significant portion continues to maintain a low level of voluntary disclosure. The studies by Hollie (2015) and Hail (2000) support this outcome. Thus, the overall level of voluntary segment disclosure among Nigerian listed companies remains relatively low.

CONCLUSION

This study investigated the transition of listed companies in Nigeria between various levels of mandatory and voluntary segment disclosures from 2015 to 2022 to determine whether the segment disclosure of the observed companies increased or decreased over the sampled period. This is important because investors have continued to express concerns over the insufficient disclosure practices of listed companies in Nigeria. To address this problem, this study employed a recursive transition matrix to track year-by-year changes in mandatory and voluntary segment disclosure levels of the companies from 2015 to 2022 to determine if segment disclosure increased or decreased. Specifically, it compared the number of companies at various disclosure levels in 2015 to subsequent years. This allowed an assessment of compliance with mandatory segment disclosure regulations as well as the extent of any additional voluntary information disclosed by companies. Findings indicate that companies' mandatory segment disclosure improved over time, starting from the base year of the study. However, the level of voluntary disclosure remained very low. Despite the numerous benefits of disclosing voluntary segment information, listed companies in Nigeria have not been providing adequate voluntary segment information to stakeholders. Therefore, the study recommends that regulators should expand mandatory disclosure requirements to ensure that companies disclose more segment information specific to the nature of their business activities and geographic locations. This expansion is necessary because the current mandatory disclosure regulations do not fully capture all the aspects of companies' activities and peculiarities. Additionally, publicly listed companies should increase voluntary segment disclosure to complement mandatory information to boost investors' confidence, reduce information asymmetry, enhance transparency, and lower the cost of capital.

AUTHOR CONTRIBUTIONS

Conceptualization: Dolapo Faith Sule.
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 Investigation: Dolapo Faith Sule.
 Methodology: Dolapo Faith Sule.
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REFERENCES

1. Aboud, A., Roberts, C., & Zalata, A. (2018). The impact of IFRS 8 on financial analysts' earnings forecast errors: EU evidence. *Journal of International Accounting, Auditing and Taxation*, 33(1), 2-17. <https://doi.org/10.1016/j.intacaudtax.2018.08.001>
2. Akerlof, G. A. (1995). The market for "lemons": quality uncertainty and the market mechanism. *Essential Readings in Economics*, 175-188. https://doi.org/10.1007/978-1-349-24002-9_9
3. Alfaraih, M. M., & Alanezi, F. S. (2011). What explains variation in segment reporting? Evidence from Kuwait. *International Business and Economics Research Journal (IBER)*, 10(7), 31-46. <https://doi.org/10.19030/iber.v10i7.4665>
4. Andre, P., Filip, A., & Moldovan, R. (2016). Segment disclosure quantity and quality under IFRS 8: Determinant and the effects on financial analysts' earnings forecast errors. *The International Journal of Accounting*, 51(4), 443-461. <https://doi.org/10.1016/j.intacc.2016.10.008>
5. Atika, A., Utami, E. R., & Simamora A. J. (2023). Does managerial ability affect segment disclosure? Evidence from Indonesia. *Journal of Accountancy and Investment*, 24(1), 169-186. <https://doi.org/10.18196/jai.v24i1.15975>
6. Becerra, M., & Santalo, J. (2006). Diversification versus specialist drives the diversification-performance relationship. *Journal of Management Research, Emerald Insight*, 4(1), 23-34. <https://doi.org/10.2753/JMR1536-5433040102>
7. Bello, S. (2016, May 23). Nigerian stock exchange delists eight companies over rules violation. *African Markets*. Retrieved from <https://www.african-markets.com/en/stock-markets/ngse/nigerian-stock-exchange-delists-8-companies-over-rules-violation>
8. Bens, D. A., Berger, P. G., & Monahan, S. J. (2011). Discretionary

- disclosure in financial reporting: an examination comparing internal firm data to externally reported segment data. *Journal of Accounting Review*, 86(2), 417-449. Retrieved from <https://ideas.repec.org/p/cen/wpaper/09-28.html>
9. Berger, P., & Hann, R. (2003). The impact of SFAS No. 131 on information and monitoring. *Journal of Accounting Research*, 41, 163-223. <https://doi.org/10.1111/1475-679X.00100>
 10. Berger, P., & Hann, R. (2007). Segment profitability and the proprietary and agency costs of disclosure. *The Accounting Review*, 82, 869-906. <https://dx.doi.org/10.2139/ssrn.436740>
 11. Bhimavarapu, V. M., Rastogi, S., & Kanoujiya, J. (2023). Ownership concentration and its influence on transparency and disclosures of banks in India. *Corporate Governance*, 23(1), 18-42. <https://doi.org/10.1108/CG-05-2021-0169>
 12. Blanco, B., Juan M., Lara, G., & Tribó J. (2015). The relation between segment disclosure and earnings quality. *Journal of Accounting and Public Policy*, 33(5), 449-469. <https://doi.org/10.1016/j.jaccpubpol.2014.06.002>
 13. Botosan, C. (2000). Evidence that greater disclosure lowers the cost of equity capital. *Journal of Applied Corporate Finance*, 12(4) 60-69. <https://doi.org/10.1111/j.1745-6622.2000.tb00019.x>
 14. Botosan, C. A. (1997). Disclosure level and the cost of capital. *The Accounting Review*, 72(3), 323-349. Retrieved from <https://api.semanticscholar.org/CorpusID:167071353>
 15. Botosan, C. A., & Stanford, M. (2005). Managers motives to withhold segment disclosure and the effect of SFAS No. 131 on analysts' information environment. *The Accounting Review*, 80(3), 751-772. <https://doi.org/10.2308/accr.2005.80.3.751>
 16. Busu, M., Vargas, M. V., & Anagnoste, S. (2023). Navigating the intricate relationship between investments and global output: A Leontief matrix case study of Romania. *Journal of Risk and Financial Management*, 16(12), 521. <https://doi.org/10.3390/jrfm16120521>
 17. Cereola, S. J., & Dynowska, J. (2022). The impact of IFRS-8, segment reporting, on the disclosure practices of Polish listed companies. *Journal of International Accounting, Auditing and Taxation*, 47. <https://doi.org/10.1016/j.intacaudtax.2022.100466>
 18. Chichernea, D. C., Schaberl, P. D., & Thevenot, M. A. (2024). Cutting through complexity: segment disclosure and pricing efficiency. *Journal of Accounting, Auditing & Finance*, 39(3), 643-672. <https://doi.org/10.1177/0148558X221086248>
 19. Cho, Y. J. (2015). Segment disclosure transparency and internal capital market efficiency: evidence from SFAS No 131. *Journal of Accounting Research*, 53(4), 669-723. <https://doi.org/10.1111/1475-679X.12089>
 20. Cohen, S. I. (2000). Growth and distribution in Russia and China: A social accounting matrix analysis. *International Advances in Economic Research*, 8, 296-304. <https://doi.org/10.1007/BF02295504>
 21. Domínguez, M. A. Á. (2012). Company characteristics and human resource disclosure in Spain. *Social Responsibility Journal*, 8(1), 4-20. <https://doi.org/10.1108/17471111211196539>
 22. Elsayed, N., Ammar, S., & Mardini, G. H. (2019). The impact of ERP utilization experience and segmental reporting on corporate performance in the UK context. *Enterprise Information Systems*, 15(1), 61-86. <https://doi.org/10.1080/17517575.2019.1706192>
 23. Ferrari, G., Jiménez, J. M., & Secondi, L. (2021). The role of tourism in China's economic system and growth. A social accounting matrix (SAM)-based analysis. *Economic Research-Ekonomska Istraživanja*, 35(1), 252-272. <https://doi.org/10.1080/1331677X.2021.1890178>
 24. Gietzmann, M., & Ireland, J. (2005). Cost of capital, strategic disclosures and accounting choice. *Journal of Business Finance & Accounting*, 32(3-4), 599-634. <https://doi.org/10.1111/j.0306-686X.2005.00606.x>
 25. Gisbert, A., Navallas, B., & Romero, D. (2024). From IAS 14 to IFRS 8: the role of proprietary and agency costs in shaping financial reporting. *Spanish Journal of Finance and Accounting / Revista Española de Financiación y Contabilidad*, 53(4), 451-474. <https://doi.org/10.1080/02102412.2024.2329502>
 26. Hail, L. (2000). The impact of voluntary corporate disclosures on the ex-ante cost of capital for Swiss companies. *The European Accounting Review*, 11(4), 741-773. <https://doi.org/10.1080/096381802000001109>
 27. Healy, P. M., Hutton, A. P. & Palepu, K. G. (1999). Stock performance and intermediation changes surrounding sustained increases in disclosure. *Contemporary Accounting Research*, 16(3), 485-520. <https://doi.org/10.1111/j.1911-3846.1999.tb00592.x>
 28. Heo, K., & Doo, S. (2018). Segment reporting level and analyst forecast accuracy. *The Journal of Applied Business Research*, 34(3), 471-486. Retrieved from <https://journals.klalliance.org/index.php/JABR/article/view/305>
 29. Hollie, D. (2015). A perspective on segment reporting choices and segment reconciliations. *Journal of Applied Finance and Accounting*, 1(2), 88-95. <https://ideas.repec.org/a/rfa/afajnl/v1y2015i2p88-95.html>
 30. Hope, O. K., & Thomas, W. B. (2008). Managerial empire building and firm disclosure. *Journal of Accounting Research*, 46, 591-626. <https://doi.org/10.1111/j.1475-679X.2008.00289.x>
 31. Hope, O., Kang, T., Thomas, W., & Vasvar, F. (2009). The effects of SFAS 131 geographic segment disclosures by U.S. multinational companies on the valuation of foreign earnings. *Journal of Inter-*

- national Business Studies*, 40(4), 421-443. Retrieved from <https://link.springer.com/article/10.1057/jibs.2008.72>
32. Ibrahim, K. (2014). Firm characteristics and voluntary segments disclosure among the largest companies in Nigeria. *International Journal of Trade, Economics and Finance*, 5(4). <https://www.ijtef.org/papers/392-A10005.pdf>
 33. International Financial Reporting Standards, IFRS. (2006). *IFRS 8: Operating Segments*. Retrieved from <https://www.ifrs.org/issued-standards/list-of-standards/ifrs-8-operating-segments/>
 34. Kobbi-Fakhfakh, S., Shabou, R. M., & Pigé, B. (2019). Intensive board monitoring, investor protection and segment disclosure quality: evidence from EU. *Accounting in Europe*, 17(1), 52-77. <https://doi.org/10.1080/17449480.2019.1646427>
 35. Lang, M., & Sul, E. (2014). Linking industry concentration to proprietary costs and disclosure: challenges and opportunities. *Journal of Accounting and Economics*, 58(2-3), 265-274. <https://doi.org/10.1016/j.jacceco.2014.08.008>
 36. Lang, M., & Lundholm, R. (1993). Cross-sectional determinants of analysts' ratings of corporate disclosures. *Journal of Accounting Research*, 31, 246-271. Retrieved from <https://ideas.repec.org/a/bla/joares/v31y1993i2p246-271.html>
 37. Le, T., Oliver, B. R., & Tan, K. J. K. (2022). Nowhere to hide: Corporate restructuring activities response to mandatory segment disclosure. *Journal of Corporate Finance*. <http://dx.doi.org/10.2139/ssrn.3697752>
 38. Loslever, P., Cabon, S., & Riera, B. (2009). Correspondence analysis and transition matrices as tools to study time-dependent multivariate data: application to the analysis of eye movement patterns. *Theoretical Issues in Ergonomics Science*, 10(3), 253-275. <https://dl.acm.org/doi/10.5555/1662648.1662654>
 39. Mardini, G. H., Tahat, Y. A., & Power, D. M. (2013). Determinants of segmental disclosures: Evidence from the emerging capital market of Jordan. *International Journal of Managerial and Financial Accounting*, 5(3), 253-276. <https://doi.org/10.1504/IJMFA.2013.058549>
 40. Mateescu, R. (2016). Segment disclosure practices and determinants: Evidence from Romanian listed companies. *The International Journal of Management Science and Information Technology*, 20, 40-50. Retrieved from <https://hdl.handle.net/10419/178824>
 41. Munisi, G. (2023). Ownership structure and information disclosure in Sub-Saharan African countries. *African Journal of Applied Research*, 9(1), 51-77. <http://dx.doi.org/10.26437/ajar.v9i1.521>
 42. Mutalib, F. A., & Jaafar, H. (2019). Segment reporting practices and determinants: Evidence from Malaysian public listed companies. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 3, 264-273. <http://dx.doi.org/10.6007/IJARAFMS/v9-i3/6456>
 43. Opara, S. (2017, March 5). 15 companies delisted from Nigerian Stock Exchange in 2016. *Punch Newspaper*.
 44. Peleaz, B. B. (2010). *Segment disclosure, cost of capital and investment efficiency* (Doctoral Thesis). Universidad Carlos III de Madrid [Charles III University of Madrid]. Retrieved from <http://hdl.handle.net/10016/9145>
 45. Prencipe, A. (2004). Proprietary costs and determinants of voluntary segment disclosure: Evidence from Italian listed companies. *European Accounting Review*, 13(2), 319-340. <https://doi.org/10.1080/0963818042000204742>
 46. Shivaani, M. V., & Agarwal, N. (2020). Does competitive position of a firm affect the quality of risk disclosure? *Pacific-Basin Finance Journal*, 61, 101-317. Retrieved from <https://ideas.repec.org/a/eee/pacfin/v61y2020ics0927538x18305250.html>
 47. Tian, Y., & Chen, J. (2009). Concept of voluntary disclosure and a review of relevant studies. *Rand Journal of Economics and Finance*, 1(2), 33-43. <https://doi.org/10.5539/ijef.v1n2p55>
 48. Wang, Q. (2015). Determinants of segment disclosure deficiencies and the effect of the SEC comment letter process. *Journal of Accounting and Public Policy*, 14(3), 38-45. <https://doi.org/10.1016/j.jaccpubpol.2015.11.005>
 49. Xiong, Y., & Yang, L. (2021). Disclosure, competition, and learning from asset prices. *Journal of Economic Theory*, 197, 105331. <https://doi.org/10.1016/j.jet.2021.105331>
 50. Yevick, D., & Reimer, M. (2007). Transition matrix analysis of system outages. *IEEE Photonics Technology Letters*, 19(19), 1529-1531. <http://doi.org/10.1109/LPT.2007.903877>
 51. Yu, Z., & Chen, G. (2000). Rescaled range and transition matrix analysis of DNA sequences. *International Academic Publishers Communications in Theoretical Physics*, 33(4). <https://doi.org/10.1088/0253-6102/33/4/673>