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Drivers of Environmental and Social Sustainability Accounting Practices in Nigeria: A Corporate Governance Perspective

Abstract

Purpose

This study investigates corporate governance mechanisms affecting environmental and social sustainability accounting practice (SAP). Four internal (quality of information technology, market orientation, business strategy, and structure of accounting department) and two external (environmental uncertainty and market competition) governance mechanisms were examined.

Design/methodology/approach

The sample of the study is comprised of 56 publicly listed manufacturing companies on the Mainboard of the Nigerian Stock Exchange. Data were collected using a questionnaire which was completed by senior finance personnel in each company in the sample. Structural equation modelling, logistic regression and quantile regression analysis were used to analyse data.

Findings

The results show that the extent to which Nigerian companies have implemented SAP is moderate. We find that the level of SAP implementation is significantly associated with market orientation and business strategy, but not with the quality of information technology and structure of accounting department. The results also show that both external corporate governance mechanisms (i.e., environmental uncertainty and intensity of competition) have no significant effect on SAP.

Originality/ Value

The study contributes to the literature on sustainability in developing countries and incrementally adds to knowledge on the corporate governance mechanisms driving SAP in jurisdictions characterised by lax regulatory framework and weak institutional apparatus on sustainability.

Practical implications

The insignificant influence of external corporate governance mechanisms on SAP corroborates the contention that external pressure on companies to implement sustainability initiatives in developing countries is weak.

Keywords: corporate governance; environmental accounting; industrialisation; sustainability accounting; sustainable development goals (SDGs); Nigerian manufacturing sector

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1. INTRODUCTION

Whatever the level of economic growth and development, sustainable development is a topical issue affecting nations of the world. This reflects in the sustainable development goals (SDGs) specified for both developed and developing countries alike (UN SDGs, 2030). The SDGs also require the implementation of environmental and social sustainability accounting practice (SAP) by corporate entities in an effort to achieving sustainable development (Tauringana, 2020). SAP is an emerging field that advocates for the identification, collection, analysis and reporting of information relating to the environmental, social and economic activities of an organisation (Mathuva et al., 2017). It provides relevant information that help organisations achieve their sustainable targets, and this includes sustainability accounting techniques such as environmental management accounting (EMA), Activity Based Costing (ABC), Life Cycle Costing, Customer Accounting, Integrated Performance Measurement, Quality Costing, and Competitor Accounting (Cadez & Guilding, 2012; Oyewo, 2021). These techniques facilitate planning, control and decision-making with respect to the sustainability endeavours of an organisation (Iredele, 2020). As applied in this study, SAP is conceptualised as the innovative and interactive use of sustainability accounting techniques to achieve predetermined environmental, social and economic goals by an organisation.

Whereas there are various factors affecting the sustainability commitment of organisations, a growing number of studies have documented that corporate governance is a key driver of SAP (Tauringana & Mangena, 2014; Ong & Djajadikerta, 2020; Haque & Ntim, 2022). These prior studies provide evidence suggesting that corporate governance affects firm's commitment to sustainability. However, they are limited to only developed countries where corporate governance is well-established and stronger (e.g., Mangena et al., 2020; Haque & Ntim, 2022). Consequently, we argue that in the settings of prior studies, the effect of corporate governance on sustainability is *ex-ante* clearer than in developing countries where

corporate governance is weak and voluntary (Ali et al. 2017; Shamil et al.2016). Furthermore, prior studies are limited on how firms are contributing to the achievement of the SDGs through sustainable practices. This is surprising given the well-acknowledged relevance of sustainability accounting to the SDGs discourse (Erin, et al., 2022), especially in developing countries (Tauringana, 2020). Not surprisingly, therefore, there have been calls for research on the achievement of SDGs, particularly in developing countries (Mathuva et al., , 2017). Whilst sustainability issues have received much attention from the government of nations especially in Asia Pacific, Europe, and Latin America, this is not the case for most African countries (Moses et al., 2019), including Nigeria (Erin, et al., 2022).

This study investigates the role of corporate governance mechanisms in enhancing the quality of SAP in the context of Nigerian, a developing country. The objectives of the study are to (i) determine the implementation level of SAP; and (ii) assess how corporate governance mechanisms affect the implementation level of SAP. In particular, we examine the effects of four internal mechanisms (quality of information technology, market orientation, business strategy, and structure of accounting department) and two external mechanisms (environmental uncertainty and market competition) on the level of SAP in Nigeria.

The debate on sustainability practice is topical in Nigeria, considering that the country is yet to realise its development potential since its independence in more than 60 years ago. Whilst SAP is voluntary in Nigeria, it becomes important to gain an understanding of how corporate governance is shaping SAP of Nigerian companies. The current study focuses on the Nigerian manufacturing sector. The Nigerian manufacturing sector is an important context for the current study because of several considerations. First, the sector is one of the critical sectors that can trigger industrialisation and economic growth through the implementation of robust sustainability practices. However, there have been reports that manufacturing companies in Nigeria pay lip service to social and environmental issues, as they merely window dress their

sustainability reports to look good in the eyes of the public in an effort to legitimise their existence (Osemeke et al., 2016). With weak institutional and regulatory frameworks for sustainability in the country, it becomes important to examine the extent to which corporate governance mechanisms have affected SAP.

Second, Nigeria (like other African countries) pays little attention to social and environmental issues (Oyewo & Isa, 2017), although there is an increasing awareness of sustainable business practice (Engert, et al., 2016). As manufacturing companies are one of the major polluters of the environment (Onyali et al., 2014), it is important to know the current state of SAP and the ensuing sustainability accounting techniques (SATs) implemented to boost sustainability activities in the sector. Third, with the current under-developed state of the country's manufacturing sector, it becomes important to unearth the governance factors that can improve SAP with a view towards enhancing industrialisation. Finally, with its demography accounting for 47% of West Africa's inhabitants and its economic position in Africa, Nigeria occupies a strategic position in both developed and developing countries. The socio-economic and infrastructural challenges confronting the country is typical of developing countries (The World Bank, 2019). Thus, an exposé on Nigeria can illuminate the feasibility of implementing SATs as a strategy to actualise SDGs by developing countries.

The sample of the study is comprised of publicly listed manufacturing companies on the Mainboard of the Nigerian Stock Exchange. We collect data using a questionnaire survey sent to senior finance managers of 56 manufacturing companies. The questionnaire asked the finance managers to answer questions relating to their company's SAP implementation as well as questions about the company's internal governance mechanisms (quality of information technology, market orientation, business strategy, and structure of accounting department) and two external governance mechanisms (environmental uncertainty and market competition). Using structural equation modelling, the results show that the implementation level of SAP by

companies is generally moderate. We also find that internal corporate governance mechanisms—in particular, market orientation and business strategy—are significantly associated with the level of SAP implementation.

Our study contributes to the literature in threefold. First, we show the current level of SAP in an emerging economy. Second, we provide firsthand empirical evidence on how different corporate governance mechanisms affect SAP in emerging economies, an area that has attracted little attention. These pieces of evidence bring to light the importance of corporate governance mechanism in achieving sustainability. This evidence can incentivise policy makers and regulators in developing stronger corporate governance mechanisms in developing countries. Third, the study contributes to the sparse literature on sustainability in developing countries.

The remainder of the paper is organised as follows. The next section presents the theoretical framework. Literature review and hypotheses development are covered in Section 3. The methodology is described in Section 4, followed by results and discussion in Section 5. Section 6 concludes the study and provides areas of future research.

2. THEORETICAL FRAMEWORK

This study invokes the stakeholder theory to explain why corporate governance mechanisms affect SAP implementation. The stakeholder theory posits that there are various interests groups impacted by business entities (Tampio et al., 2022). Whereas stakeholders have different levels of interest and power, stakeholder mapping is useful for deciding the appropriate response to stakeholders expectations (Tampio et al., 2022). Notwithstanding the outcomes of stakeholder mapping, society expects corporations to behave in a manner that is beneficial to all stakeholders (Freeman, 1984; Mitchell et al., 1997). In corporate entities, ownership is usually separated from control, and to ensure the company is managed in the best

interest of stakeholders, owners would institute governance structures as monitoring mechanisms to curtail the opportunistic tendencies of managers (Jensen & Meckling, 1976; Mangena et al., 2020, etc). Corporate governance mechanisms ensure that managers discharge their fiduciary responsibilities efficiently.

Within the context of the current discourse, the need to preserve the ecosystem for the benefit of the society will motivate organisations to implement environmental and social sustainability techniques such as environmental management accounting (EMA), Activity Based Costing (ABC), Life Cycle Costing, Customer Accounting, Integrated Performance Measurement, Quality Costing, and Competitor Accounting. Recent studies have seen the inclusion of EMA as a contemporary management accounting technique that embodies sustainability ramifications (e.g. Gupta, 2011; Egbunike et al., 2014). As competitor information and customer information are vital elements of the sustainability of businesses (Cadez & Guilding, 2012), other modern management accounting techniques such as Activity-based Costing (ABC)/Management and integrated performance measurement are also relevant for sustainability accounting. The application of ABC facilitates the tracking and management of environmental costs (Oyewo, 2021).

Customer accounting supports the philosophy of providing goods and services that better serve the needs of customers (an element of social sustainability on responsible consumption and production). Lifecycle costing promotes product sustainability since it assists in cost profiling over a product's lifetime (Chartered Institute of Management Accountants, CIMA, 2008). Lifecycle costing records not only production costs but also pre-production (including research and development and technical data), distribution, advertising, and abandonment costs, and this is valuable in achieving product profitability improvements (Adler, Everett & Waldron, 2000). The product lifecycle concept reflects the awareness that products have a lifespan, and the knowledge about product life-expectancy guides price

fixation and pricing strategy that ensures customers can continue to afford a product without compromising cost recovery and investments by manufacturers.

In sum, the need to achieve sustainability targets as a legitimising strategy to gain approval of stakeholders will motivate organisations to emplace internal governance mechanisms relating to strategy and structure (i.e., structure of the accounting department, business strategy, information technology (IT) and market orientation), as well as external governance factors (including environmental uncertainty and market competition). The stakeholder theory, therefore, informs the consideration that a positive association between corporate governance mechanisms and SAP implementation may be anticipated.

3. LITERATURE AND HYPOTHESES DEVELOPMENT

3.1 Enhancing Sustainability Practice Through Sustainability Accounting Techniques

Sustainability accounting is an overarching concept that integrates three pillars—environment, social and economic (Schaltegger & Buritt, 2010). According to Schaltegger and Buritt (2010, p.377), sustainability accounting is an accounting method that "attempt to create and provide high quality, relevant information to support corporations in relation to their sustainable development". The criticality of SAP to the sustainable development discourse is underpinned by the recommendation from the 1992 UN's Earth Summit on sustainable development urging UN member countries to develop an environmental accounting system. SAP is usually implemented through the deployment of SATs. SATs, with respect to this study, are contemporary management accounting techniques that facilitate planning, control and decision-making with respect to the sustainability endeavours of an organisation. SATs improve the quality of sustainability reports (Mathuva & Kiweu, 2016; Oyewo & Isa, 2017), thus encouraging companies to integrate sustainability information into their reporting cycles.

Companies impact the environment and society through their activities. Hence, environmental and social management regulations require that they minimise the negative impacts of their operations on the ecosystem and human beings (Iredele, 2020). As part of SAP, companies are expected to extensively disclose the environmental, social and economic impact of their activities through the presentation of a sustainability report. Mathuva et al. (2017) contend that environmentally visible firms disclose more environmental information in their annual reports. Relatedly, Bennett, Schaltegger and Zvezdov (2011) argue that to report on environmental issues, an organisation should have an internal measurement system installed. This implies that sustainability reports reflect the internal sustainability mechanisms emplaced in organisations and their overall sustainability practice.

In driving their sustainability initiatives, organisations typically adopt and implement management and accounting techniques that are environmentally focused and social-sustainability relevant (Soderstrom et al., 2017). SATs contribute to sustainability because costing information, competitor information and customer information are vital elements of the sustainability of businesses. Going by the conceptual definitions of sustainability accounting, externally oriented management accounting techniques such as Environmental Management Accounting (EMA), Activity Based Costing (ABC), Life Cycle Costing, Customer Accounting, Integrated Performance Measurement, Quality Costing, and Competitor Accounting fall within the remit of sustainability accounting.

3.2 Determinants of Sustainability Accounting Practice

Literature suggests that there are various governance factors affecting the adoption of management accounting innovation, including SAP, such as board structure, organisational structure, organisational culture, technology and system of communication, business strategy, and nature/influence of the external environment (Baumann et al., 2015; Kamarudin et al. 2021). According to Baumann et al. (2015), internalities or pull factors are internal conditions

that may promote SAP implementation. These internalities include size, history, technology, availability of skilled personnel, availability of resources, competitive strategy and customer base/ market orientation. The pull/ internal contextual factors incentivise the internalisation of SAP (Pitcher, 2015). Externalities or push factors are conditions, mostly external to the organisation, that force companies to implement SAP, and this may include environmental uncertainty, interdependence with other organisations, competition, centralisation of power and control. Studies have documented the greater propensity to use *ex-ante* information and externally oriented management accounting systems during times of uncertainty and environmental hostility (Gul & Chia, 1994; Oyewo, 2022).

The current study, however, focuses on four internal corporate governance mechanisms related to strategy and structure (i.e., structure of the accounting department, business strategy, information technology (IT) and market orientation) and two external environmental governance factors (namely environmental uncertainty and market competition). The four strategy and structure variables were selected because they have been emphasized in literature as key determinants of the adoption of management accounting innovations such as SAP (Cadez & Guilding, 2012). The choice of the two external variables was also informed by the consideration that they strongly drive SAP (Gul & Chia, 1994; Dupire & M'Zali, 2018). Taken together, the six variables are yet to be rigorously investigated in spite of their acknowledged importance as key corporate governance mechanisms affecting SAP.

3.2.1 Structure of accounting department

The structure of the accounting/finance department in terms of skill may affect the implementation level of SAP because the skill mix and level of competence available in an organisation affects accounting practice (Gomez-Conde et al., 2019). Accountants use their knowledge of business, knowledge of methods, rules, regulations, and knowledge of the

business environment to produce reports meaningful and useful to support management. How well the accounting function is performed is influenced by the quality of skills available within the organisation. The issue of quality of accounting personnel manning the accounting function is especially topical considering that the successful implementation of SAP requires special skills because of the technicalities and challenges of implementing SATs as a result of their nascent nature in developing countries.

Limited knowledge and paucity of experienced personnel has been documented as major challenges of implementing SAP (Sousa et al., 2017). The structure of the accounting/finance department in terms of availability of requisite skills is, thus, a critical governance factor affecting SAP implementation. While organisations with highly-knowledgeable accounting personnel may extensively implement SAP, organisations with accounting staff having shallow or limited knowledge of SAP may implement it at a superficial level. Best practice in corporate governance requires that the accounting/finance function is staffed with competent personnel. This informs the hypothesis that:

H1: A robust accounting department structure enhances SAP implementation

3.2.2 IT sophistication

The resources of an organisation include tangible assets, organisational processes, information and knowledge, capabilities, and firm attributes (e.g., organisational lifecycle, size, affiliation, goodwill, etc) which altogether enables it to conceive and implement strategies (Daft, 1983). Information technology (IT) is a critical asset that has strategic ramifications because IT enhances the ability of an organisation to scan the external environment and implement strategies that enables it take advantage of business opportunities (Kraft et al., 2022). Eisenhardt and Martin (2000) and Barney et al. (2001) argue that it is not the mere

possession of resources that delivers competitive advantage, but the ability to change quickly and be more alert to changes in the business environment. Since IT contributes to organisational agility, the promptness with which an organisation responds to environmental and social sustainability issues may be determined by the degree of its IT sophistication. The type of SAP implemented may depend on the degree of IT sophistication because SATs thrive on the quality of information technology. As the degree of sophistication in IT would be disproportionate across organisations, implementation level of SAP would also anticipatorily differ. Organisations having a more sophisticated IT architecture may be able to implement varieties of SATs and consequently have a more robust SAP (Maelah *et al.*, 2017). Therefore,

H2: High degree of IT sophistication contributes to SAP implementation

3.2.3 Business strategy

Business strategy is arguably the most widely cited (internal) governance factor affecting SAP implementation (Cadez & Guilding, 2012). Abdel Al and McLellan (2013) utilise the cost-leadership/ differentiation strategy-taxonomy to investigate the degree of fit between management accounting practice and organisational strategy. They conclude that companies deploying only conventional management accounting practices (i.e., companies with low utilisation rate of SATs) tend to follow a low-cost strategy, whereas companies that apply advanced management accounting practices (i.e., organisations with robust SAP) predominantly adopt differentiation strategy. Other studies have also documented the influence of business strategy on the type and usage intensity of SATs (Abdel-Kader & Luther, 2008). Considering that SAP strengthens sustainability practice (Mathuva & Kiweu, 2016), organisations may implement SAP as a corporate sustainability strategy to achieve their SDGs targets and gain stakeholders' acceptance as proposed by the stakeholder theory (Tampio et al.,

2022). Thus, SAP implementation could be a deliberate strategy deployed by forward-looking firms to legitimise their existence. This discussion informs the argument that

H3: Deliberate strategy-formulation will promote SAP implementation

3.2.4 Market orientation

Considering that market orientation is underpinned by the philosophy that the activities of an organisation should be geared towards satisfying customers' needs (Walker et al., 1998), this may influence the type and usage intensity of SATs. Organisations seeking to create superior value for customers in an effective and efficient manner may be motivated to implement customer-driven SATs such as customer accounting, lifecycle costing, and integrated performance measurement system (Al-Mawali, 2015). Companies with strong market orientation will attach great importance to market-orientated information, and because highly market-oriented organisations have a very strong external focus (Alet Vilaginés, 2022), a positive association between market orientation and SAP may be envisaged (Al-Mawali, 2015). Therefore,

H4: High market orientation promotes SAP implementation

3.2.5 Intensity of competition

Competitive advantage is a direct consequence of the strategies implemented by a firm intended for adding value to customers (Alet Vilaginés, 2022). Customer-focused goods or services are important facets of competitive advantage (Gan et al., 2006; Varki & Colgate, 2005). The creation of value would typically involve the deployment of resources in a strategic manner. Value creation has become a global issue as a result of recurring instances of corporate failure and collapse, competitive market and stock market pressure (Lau & Tong, 2008). Thus, the development of some SAP is not unconnected to the need to survive fierce competition

(Ahmad & Zabri, 2015). Scholars have argued that competition is the most important external factor stimulating the installation of new cost and management accounting system (Cadez & Guilding, 2008). For instance, SATs such as competitor accounting, lifecycle costing, customer accounting and integrated performance measurement system have been gaining traction due to fierce competition characterising the modern business environment. Companies in difficult competitive situations would want to assess performance from all dimensions available to them (Abdel-Maksoud et al., 2005). Best practice in corporate governance requires that mechanisms must be emplaced to monitor competition on a regular basis (Dupire & M'Zali, 2018). Hence,

H5: Intensity of competition is positively associated with SAP implementation

3.2.6 Perceived environmental uncertainty

Perceived environmental uncertainty (PEU), another concept connected to the external business environment, refers to the totality of physical and social variables affecting decision-making (Gordon & Narayanan, 1984). Organisations operating in highly uncertain environment have a greater impetus to extensively implement SATs (such as competitor accounting, customer accounting, and lifecycle costing, amongst others) to survive uncertainty. Greater level of uncertainty in the environment causes higher importance to be attached to external, non-financial information (Abaidoo & Agyapong, 2022), and this may be associated with high usage of integrated performance measurement system. Conversely, when PEU is low, predictions about the market may be relatively accurate, thus diminishing the need for external and *ex-ante* information (Gul & Chia, 1994; Naidenova, 2022), and lower usage of SAP. A robust corporate governance apparatus will institutionalise structures to regularly scan the environment to ensure the organisation anticipates changes and implement measures that ensure organisational survival (Kamarudin et al. 2021). Therefore,

H6: High level of perceived environmental uncertainty will drive SAP implementation

4. METHODOLOGY

4.1 Research Design

The study adopted a quantitative research design. The population of the study is comprised of operational manufacturing companies listed on the Main board (first-tier security market) of the Nigerian Stock Exchange (NSE). From the scrutiny of companies satisfying this criterion, a total of 56 firms emerged and were all included in the study. Data were collected using a structured questionnaire (Cadez & Guilding, 2012; Ahmad & Zabri, 2015). A copy of the questionnaire (Appendix 1) was dispatched to each company which was expected to be completed by senior finance personnel on behalf of their companies. The questionnaire was accompanied with a covering letter, which clearly explained the purpose of the survey and the target respondents. To ensure the target respondents complete the questionnaire, the cover letter expressly stated that senior finance personnel that are sufficiently knowledgeable about the accounting system and governance structure of their respective organisations should complete the questionnaire.

4.2 Measurement of Variables

4.2.1 Sustainability Accounting Practice

Based on the measurement scale applied in prior studies (e.g., Cadez & Guilding, 2012; Ahmad & Zabri, 2015), respondents were requested to rate the extent of usage of seven SATs on a 5-point scale of 1 (‘not at all’) to 5 (‘very great extent’). The techniques enlisted are: Environmental Management Accounting, Activity-based costing, Life cycle costing, Customer profitability analysis, Integrated performance measurement, Quality costing and Competitive position monitoring. To ensure a correct response, each technique was briefly described in the questionnaire using the approach adopted by prior studies (Cadez & Guilding, 2012).

Both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to examine the validity and reliability of SAP (Schreiber et al., 2006). From the result of EFA, all seven items/techniques measuring SAP loaded strongly (above 0.7) on component 1, explaining 64.754% of the variance. CFA also shows that items loaded above 0.60, providing statistical evidence that the enlisted SATs reliably measured SAP. The seven items were combined to derive a latent variable (in a SEM context) called sustainability Accounting Practice Implementation (SAP).

4.2.2 Governance Factors affecting Sustainability Accounting Practice

Following prior studies (Al-Mawali, 2015; Ahmad & Zabri, 2015), we considered four internal governance factors, (*Quality of Information Technology, Market orientation, Business Strategy* and *Structure of Accounting Department* in terms of the availability of Accounting Skills) and two externally-oriented governance mechanisms for monitoring the exogenous business environment (Perceived Environmental Uncertainty and Intensity of Competition.

Quality of Information Technology (QIT) is measured by adapting the scale developed by Teng, Cheon and Gover (1995). *Market orientation (MKT)* is measured using the scale used in prior studies (Al-Mawali, 2015). *Business Strategy* is measured in terms of deliberate strategy-formulation (STRG) using Cadez and Gulding's (2012) measurement. *Structure of accounting department in terms of the availability of skills* (SKILLS) is operationalised using measurement scale developed by the authors for the study. Respondents were requested to indicate how the Management Accounting Function is looked after based on the following options: (i) there is a separate Division/ Department/ /Unit to handle the work related to Management Accounting (assigned code 5); (ii) Each of the Functional Departments manages its Management Accounting needs (assigned code 4); (iii) the Management Accounting Function is overseen by the Financial Controller as and when the need arises (assigned code 3); (iv) Financial Accounting information is used for Management Accounting purpose by the

Functional Departments (assigned code 2); and (v) There is no need for specific Management Accounting information (assigned code 1). Whilst code '5' implies a more organised management accounting system/ high level of accounting skills availability, code '1' connotes a less organised management accounting function/ low level of accounting skills availability. *Perceived Environmental Uncertainty* (PEU) is measured by adapting Kren & Kerr's (1993) instrument. *Intensity of Market Competition* (CMPT) is measured by adapting the scale developed by Hansen & Van der Stede (2004). All variable definitions are provided in Appendix 2.

4.3 Validity and Reliability

Internal validity was achieved by adopting and adapting existing scales used in prior studies to measure variables. Internal consistency was assessed using Cronbach Alpha and Kaiser-Meyer-Olkin (KMO) Measure of Sampling. The Cronbach's alpha coefficients for all the multi-item variables are above the recommended 0.70 minimum (Drost, 2011). The KMO test confirms that the sampling is adequate since the coefficients are above the recommended minimum of 0.5 (Cerny & Kaiser, 1977). The KMO statistics also confirm the factorability of variables. Furthermore, the p-value of Bartlett's Test of Sphericity is significant for all items at 5% (i.e., $p < .01$), indicating sufficient items for each factor. These results confirm internal consistency.

4.4 Model Specification

We apply structural equation modelling (SEM) to examine the relationship between the corporate governance mechanisms and SAP. The model is speficied as follows:

$$SAP = \alpha_0 + \alpha_1 \text{QIT} + \alpha_2 \text{MKT} + \alpha_3 \text{STRG} + \alpha_4 \text{SKILLS} + \alpha_5 \text{PEU} +$$

$$\alpha_6 \text{CMPT} + \alpha_7 \text{STRC} + \alpha_8 \text{SIZE} + et \quad (1)$$

SAP is score computed from data as collected using the questionnaire. The computation involved additively combining and averaging all SATs scores to derive score for SAP. In addition to the governance variables, we also include degree of centralisation or decentralisation, and company size as controls. *Degree of centralisation or decentralisation* (Agasisti et al., 2008) was applied as a control variable because firms operating a decentralised structure have higher propensity to adopt SAP in comparison to firms characterised by a centralised structure (Gerdin, 2005). *Organisational size* (Ahmad & Zabri, 2015) was also included as control variables as they affect the implementation of management accounting practice. Large firms are more likely to have a more robust SAP than small firms (Bui et al., 2020). Degree of centralisation or decentralisation (STRC) is measured using a scale developed by the authors for the study. Respondents were asked to indicate on a scale of 1 (not at all) to 5 (very high extent): (i) level of power given to divisional managers/ departmental heads; (ii) level of independence accorded to branches/subsidiaries in making key decisions, and; (iii) degree to which responsibilities are shared to branches/ subsidiaries. *Organisational size* (SIZE) is operationalised using Total Revenue. To normalise the data, we use a three-year average logarithmic transformation of Total Revenue (Ahmad & Zabri, 2015).

5. EMPIRICAL FINDINGS AND DISCUSSION

5.1 Response Rate and Non-response Bias

From the fifty-six (56) copies of the questionnaire administered, forty-seven (47) copies were retrieved, representing a response rate of 83.9%; two (2) copies were unsuitable for use because of incomplete response thereby reducing the number of usable copies to forty-five (45).

The forty-five (45) valid responses were processed for analysis. Non-response bias was evaluated by comparing the firm characteristics (ROA, Tobin's Q and Market share) of responding firms with those that did not respond (Ahmad & Zabri, 2015). Result from t-test shows that there is no significant difference in profitability (p = .412), Tobin's Q (p = .884) and market share (p =.192) between those companies that responded and others that did not. The profile of respondents and characteristics of study companies are summarised in Table 1.

<Insert Table 1 here>

5.2 Implementation Level of Sustainability Accounting Practice

Results from the analysis of SATs implementation level are presented in Tables 2 and Figure 1.

<Insert Table 2 here>

<Insert Figure 1 here>

In Table 2, the usage intensity of SATs is generally moderate, as the mean scores of five out of the seven techniques are greater than 2.0 but less than 4.0, notably Quality costing (M = 3.47), Competitive position monitoring (M = 3.36), Customer profitability analysis (M = 3.16), Activity-based costing (M = 3.13), and Integrated performance measurement (M = 3.07). The other techniques, namely Life cycle costing (M = 2.98) and Environmental Management Accounting (M = 2.71), have lower mean scores in comparison to the first five SATs, implying that they are less popular among manufacturing companies in Nigeria. The usage rate of the techniques varies noticeably among the companies as indicated by the standard deviation scores, fluctuating from 1.198 to 1.433 on the 5-point measurement scale.

The boxplot (Figure 1) provides a visual display of the statistical properties of the seven techniques. The box for quality costing is the shortest and closest to the highest point on the graph (point 5 on the y-axis). Further, the box lies between the values of 3 and 4, implying that most companies have a usage rate of 3.0 to 4.0 for quality costing. This is consistent with the result in Table 2 in which quality costing has the highest mean score of 3.47. On the other hand, the box for environmental management accounting is closest to the point of origin '0', whilst the box lies between the values of 2 and 3, implying that most companies have a usage rate of 2.0 to 3.0 for environmental management accounting. Whilst other techniques such as Activity-based costing, lifecycle costing, integrated performance measurement and customer profitability analysis generally have their boxes between values of 2 and 4, environmental management accounting has its box in the 2-3 range and quality costing in the range of 3-4. This result confirms that quality costing is the most common technique, while environmental management accounting is the least utilised technique as earlier reported in Table 1. The overall Mean of 3.12 (Table 3), equivalent to 62.4% on the 5-point measurement scale, suggests that the overall implementation level of SAP by companies is generally moderate.

5.3 Factors Affecting Sustainability Accounting Practice

5.3.1 Summary descriptive statistics

The summary descriptive statistics in Table 3 shows that the Mean SAP score is 3.123, implying that the level of SAP implementation by manufacturing companies in Nigeria is moderate. However, the minimum SAP score of 1.14, the maximum of 4.57, and the standard deviation of 1.037 confirms that companies vary in their levels of commitment to SAP implementation. The Mean score of 3.915 for QIT suggests that the quality of IT in the companies is also generally moderate, and the standard deviation of .854 shows that the level of variation in QIT among the companies is minimal. Companies differ in their levels of market

orientation (MKT) as shown by the standard deviaton of 1.042, although the overall mean of 3.894 confirms that the general perception on market orientation is moderate. A similar pattern is observable for deliberate strategy formulation (STRG), with a Mean of 3.111 indicating that taking a deliberate approach to strategy issues is still less popular among the companies. Although the overall mean of 4.33 for structure of accounting department (SKILLS) suggests that the level of skills availability is appreciable, a closer examination of the standard deviation of 1.087 connotes that the difference in skills availability is pronounced among the companies. The Mean of 2.922 for perceived environmental uncertainty (PEU) indicates that measures put in place by organisations to monitor and predict the actions of external stakeholders is weak. Whereas the mean score of 4.00 for intensity of market competition (CMPT) indicates that companies frequently assess competition intensity in the external business environment, the high standard deviation of 1.044 implies that the frequency or regularity of such assessment varies across companies. The level of centralisation (STRC) and organisational size (SIZE) also vary across organisations going by the Mean (standard deviation) of 3.155 (.903) and 9.892 (1.138) respectively. In general, the result in Table 3 indicates that SAP, governance factors and control variables considerably vary among companies, and such variation provides a rich context for exploring how internal and external governance factors affect SAP.

<Insert Table 3 here>

5.3.2 Results of Structural Equation Modelling

In this section, we analyse the impact of the governance factors on SAP using structural equation modelling (SEM). We start by assessing whether both the dependent variable and independent variables are normally distributed using Shapiro-Wilk test. Result shows that the *p* values are above 0.05 in all cases, implying that data is normally distributed (Razali & Wah, 2011). We then test for multicollinearity by performing correlation analysis among the

independent variables. As reported in appendix 3, the correlation coeffcients are below 0.80, confirming that multicollinearity is not a problem (Tabachnick & Fidell, 2001)

Next, we perform structural equation analysis using SEM, and the results of the analysis are reported in Table 4 and Figure 2.. Figure 2 shows the modelled relationship between the variables pictorially.

<Insert Table 4 about here>

<Insert Figure 2 about here>

In Table 4, RMSEA p < 0.05, confirming model fitness (Schreiber et al., 2006). From Table 4, two internal governance factors namely market orientation (MKT) (β = .447, p < 0.01), and strategy (STRG) (β = .290, p < 0.01) are statistically significant, while quality of information technology (QIT) (β = .126, p > 0.05) and structure of accounting department (SKILLS) (β = -.061, p > 0.05) are not. This supports the rejection of H1 (*A robust accounting department structure enhances SAP implementation*) and H2 (*High degree of IT sophistication contributes to SAP implementation*) and acceptance of H3 (*Deliberate strategy-formulation promotes SAP implementation*) and H4 (*High market orientation promotes SAP implementation*). None of the two external corporate governance mechanisms—perceived environmental uncertainty (PEU) (β = .111, p > 0.05) and intensity of competition (CMPT) (β = .073, p > 0.05)—is statistically significant. Thus, we reject H5 (*Intensity of competition is positively associated with SAP implementation*) and H6 (*High level of perceived environmental uncertainty will drive SAP implementation*). Overall, these results suggest that whereas governance mechanisms such as market orientation and strategy are important drivers of SAP implementation, quality of information technology, structure of accounting department in terms of skills availability, environmental uncertainty and intensity of competition are not.

Organisational size, SIZE is also statistically significant (β = .205, p < 0.01), confirming that organisational size affects SAP and validating its inclusion as a control variable. .

5.3.3 Robustness Checks: Logistic Regression

We perform logistic regression analysis as a robustness check on the factors affecting SAP. Based on the SAP score, companies were dichotomised into SAP sophistication level of *Basic* and *Advanced* (SAP). Companies with SAP score below 3.12 (the Mean score) were labelled "Basic SAP users" (coded '0') while companies with SAP score of 3.12 and above were regarded as "Advanced SAP users" (coded '1'). The results are presented in Table 5.

<Insert Table 5 about here>

The full model was statistically significant at 5% [χ^2 (8) = 35.458, p = .000 < 0.01] and was able to successfully distinguish between *basic* and *advanced* users of SAP. The Cox & Snell R Square coefficient of .545 and the Nagelkerke R Square of .737 indicate that 54.5% to 73.3% of the likelihood of basic or advanced SAP implementation is attributable to the corporate governance factors as predictor variables. Overall, predictions were correct 41 times out of 45 times, accounting for an overall success rate of 91.1%.

From the result in Table 5, market orientation, MKT (β = 2.188, *Odds ratio* = 8.918, p < 0.10) and deliberate strategy-formulation, STRG (β = 2.466, *Odds ratio* = 11.778, p < 0.05) are the two significant predictors of SAP sophistication. The *odds ratio* of 2.188 for MKT implies that one unit of increase in market orientation will bring about 2.188 rate of increase in SAP intensity. Similarly, the *odds ratio* of 2.466 for STRG indicates that one unit increase in deliberate strategy-formulation will bring about 2.466 increase in SAP intensity. These results are consistent with the earlier results in Table 4, thus validating the influence of market orientation and deliberate strategy-formulation as corporate governance variables affecting

SAP implementation. The result also supports the acceptance of H3 and H4, and the rejection of H1, H2, H5 and H6 respectively.

5.3.4 Additional Analysis: Quantile Regression

We also perform quantile regression (QR) analysis as a robustness check on the factors affecting SAP. QR allows capturing non-monotonous and non-uniform impacts of the independent variables on the dependent one (Coad & Rao, 2006). QR analysis is also more robust than ordinary least square (OLS) because it assumes no normal distribution of data (Li, et al., 2015; Gallego-Álvarez & Ortas, 2017). The results are presented in Table 6 and graphed in Figure 3.

<Insert Table 6 about here>

<Insert Figure 3 here>

The results in Table 6 show that market orientation (MKT) is statistically significant at quantiles (0.30, 0.70, 0.80 and 0.90). The coefficients are highest in quantiles 0.80 and 0.90, implying that organisations with high market orientation are likely to extensively implement SAP. Further, deliberate strategy-formulation (STRG) is statistically significant in quantiles (0.40, 0.50, 0.60 and 0.70), suggesting that organisations that are deliberate about strategy formulation will want to extensively implement SAP as a strategy to legitimise their existence. Organisational size also emerged as a significant control variable (in quantiles 0.10, 0.20 and 0.60) confirming that large-sized organisations will have the resources to implement SAP as suggested by the resource-based view theory. The other corporate governance variables are not statistically significant across the quantiles.

The result graphed in Figure 3 provides further insight by showing that the relationship between SAP and the governance factors is curvilinear. The impact of the governance factors on SAP rises, peaks and falls across the quantiles. This connotes that organisations will have to settle for an optimal mix of governance factors to achieve the best outcome for SAP implementation. For instance, the impact of market orientation (MKT) on SAP is maximised in quantiles 0.80 and 0.90, implying that whilst market orientation may not yield the desired result at shallow level of implementation, its impact on SAP is optimised when market orientation becomes stronger. Similarly, the curvilinear relationship between SAP and deliberate strategy-formulation (STRG) implies that although strategy formulation ordinarily improves SAP, its impact on SAP may be counterproductive if gap analysis is not undertaken from time to time to reinvigorate competitive strategies. Thesame is true for other governance factors.

Overall, the results in Table 6 are consistent with the results in Tables 4 and 5 that market orientation and deliberate strategy-formulation are notable corporate governance variables affecting SAP implementation.

5.4 Discussion

The results show that the overall implementation level of SAP by companies is generally moderate (Table 3). These results are consistent with the findings of prior studies that the sustainability practice of Nigerian companies is still rudimentary (e.g., Onyali et al., 2014; Iredele, 2020). Result shows that the structure of accounting department in terms of skills availability does not significantly influence SAP. This may be attributable to lack of relevant experience and skills to implement innovative management techniques, as the quality and type of skills available affect SAP implementation (Sousa et al., 2017). The quality of IT also has no significant impact on SAP, possibly because the level of investment in advanced technology in Nigerian manufacturing companies is still basic. To support the overall competitive strategy of the organisation, SAP requires the deployment of advanced information technology (Maelah et al., 2017).

Result shows that deliberate strategy-formulation promotes SAP implementation as reported in prior studies (Tampio et al., 2022). The longterm orientation of SAP requires deliberate strategy formulation and implementation. The result that high market orientation promotes SAP implementation extends prior studies on the relevance of market orientation in determining the adoption of customer-driven SATs (Al-Mawali, 2015; Alet Vilaginés, 2022). Further, the emergence of market orientation as a strong predictor of SAP (Tables 4 and 5) bolsters the argument that, in line with the dictates of responsible production (SDG 12), customer-conscious companies will implement SAP to ensure their production processes minimise hazards to human lives and the environment (i.e., eco-friendly production). This is regarded as an effective legitimisation strategy by manufacturing companies to gain stakeholders acceptance as suggested by the stakeholder theory (Freeman, 1984; Mitchell et al., 1997; Shamil et al., 2016). In addition, customer-oriented companies will implement SAP as a mechanism to avoid the circulation of products that are injurious to the health and safety

of customers (SDG 12 on responsible consumption). SAP can also embolden product labelling by manufacturers (Oyewo & Isa, 2017) since the production process and products comply with best practice in responsible manufacturing and product responsibility. As consumers are becoming increasingly aware of the need to consume eco-friendly products, Nigerian manufacturing companies that want to remain competitive will have to embrace SAP to compete favourably at the international scene.

Intensity of competition does not significantly affect SAP implementation, implying that external pressure to implement SAP is not strong in the Nigerian context. Meanwhile, studies have shown that best practice in corporate governance requires constant monitoring of external business environment to remain competitive (Dupire & M'Zali, 2018). Relatedly, environmental uncertainty has no significant impact on SAP, suggesting that manufacturing companies in Nigeria do not attach much importance to external information on environmental and social sustainability practice as to constantly monitor the competitive business environment (Abaidoo & Agyapong, 2022). In sum, the insignificant influence of the two external governance factors (i.e., intensity of competition and perceived environmental uncertainty) on SAP (Tables 4 and 5) provides additional evidence that external pressure on companies to implement sustainability initiatives is weak. This result also suggests that because Nigerians are less concerned about environmental issues such as patronising environmentally friendly products, waste disposal, recycling, and energy consumption (Moses et al., 2019), the motivation for manufacturing companies to embrace sustainable manufacturing practice is weak. Consequently, there have been calls to strongly regulate sustainability practice in the country (Oyewo & Isa, 2017; Moses et al., 2019). Manufacturing companies may also not be implementing SAP appreciably perhaps because their financial performance is not impacted in the short-run (Iredele et al., 2020). Slight improvement in sustainability practice from shallow

to moderate level as noted by this study provides empirical evidence to support the claim of Moses et al. (2019) that SAP is gaining momentum in Nigeria.

The result that organisational size significantly affects SAP implementation provides empirical support that large-sized organisations may have the resources to implement robust SAP (Tauringana, 2020). With respect to the relevance of the result to the theory invoked for the study, the emergence of deliberate strategy-formulation and market orientation as notable drivers of SAP provides support for the stakeholder theory that companies will emplace corporate governance mechanisms as a strategy for achieving sustainability outcomes (Freeman, 1984; Mangena et al., 2020).

6. CONCLUSION

This study examines whether governance structures influence the implementation of SAP. Considering that the achievement of the UN SDGs 2030 is at country-level, it becomes important to investigate strategies that can be implemented by developing countries to turn the goals to reality. The study concludes that internal corporate governance factors such as market orientation and deliberate strategy formulation are key drivers of SAP. The study also concludes that companies will emplace corporate governance mechanisms as a strategy for achieving sustainability outcomes, thus validating the stakeholder theory.

The insignificant impact of quality of information technology and structure of accounting department (in terms of skills availability) on SAP has some practical implications. Although IT has the potential to promote the usage of SAP, the quality of IT facilities in Nigerian manufacturing companies may not be sophisticated enough to drive the rigorous implementation of SAP. To this end, the study recommends the revitalisation of technological facilities and the upgrade of technological capabilities of industrial sectors in Nigeria in line with SDGs 9.4 and 9.5.

The structure of accounting department/ availability of accounting skills may not have noticeably influenced the sophistication level of SAP possibly because knowledge on sustainability accounting as an emerging field may be generally basic or rudimentary among accounting professionals in Nigeria as well as other developing countries. The deployment of SATs such as EMA, ABC, Lifecycle costing, customer accounting and competitor accounting, amongst others, requires adeptness in integrating knowledge on accounting, management, marketing and strategy. Considering that accountants in developing countries are predominantly trained in functional areas of accounting, knowledge of modern management accounting techniques may be limited, causing a shallow implementation level of SAP. This claim is backed by the generally moderate usage level of the SATs. Thus, there may be no pronounced difference in the quality of accounting skills on sustainability accounting across manufacturing companies, whatever the structure adopted to organise the accounting function. Following from the omnibus nature of the sustainability accounting—spanning across functional departments in an organisation—it is recommended that knowledge-driven organisations should invest in training and development of accounting and non-accounting personnel in line with SDGs 8.5 and 8.8.

Our study contributes to the literature in threefold. First, we show the current level of SAP in an emerging economy. Second, we provide firsthand empirical evidence on how different corporate governance mechanisms affect SAP in emerging economies, an area that has attracted little attention. These pieces of evidence bring to light the importance of corporate governance mechanism in achieving sustainability. This evidence can incentivise policy makers and regulators in developing stronger corporate governance mechanisms in developing countries. Third, the study contributes to the sparse literature on sustainability in developing countries.

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Table 1: Respondents' Profile and Characteristics of Study Companies

	Panel A: Respondents Profile			
Variable	***Category***	***Freq.***	***%***	***Total***
Educational Qualification	B.Sc./ HND	18	40.0	
	Masters	27	60.0	45
Length of Experience (years)	5-10 years	13	28.9	
	11-20 years	23	51.1	
	Above 20 years	9	20.0	45
Job Title	Chief Finance Officer/ Financial Director	12	26.7	
	Chief Accountant	10	22.2	
	Senior Accountant/ Financial Controller	13	28.9	
	Management Accountant	10	22.2	45
	Panel B: Company Characteristics			
Variable	***Category***	***Freq.***	***%***	***Total***
Location of Parent Company/ Head office	In Nigeria	36	80.0	
	Outside Nigeria	9	20.0	45
Existence of Management Accounting Department	Yes	33	73.3	
	No	12	26.7	45
How Management Accounting is looked after in the absence of a Management Accounting Department	Each of the Functional Departments manages its Management Accounting needs	3	25.0	
	overseen by the Financial Controller as and when the need arises	5	41.7	
	Financial Accounting information is used for this purpose by the Functional Departments	4	33.3	12

Table 2: Usage Rate of Sustainability Accounting Techniques

	Sustainability Accounting Techniques	Min.	Max.	Mean	SD
1	Quality costing	1	5	3.47	1.198
2	Competitive position monitoring	1	5	3.36	1.433
3	Customer profitability analysis	1	5	3.16	1.296
4	Activity based costing	1	5	3.13	1.307
5	Integrated performance measurement	1	5	3.07	1.355
6	Life cycle costing	1	5	2.98	1.252
7	Environmental Management Accounting	1	5	2.71	1.218
	Overall Mean (SAP)			*3.12*	

Table 3: Descriptive Statistics of Sustainability Accounting Practice, Governance and Control Variables

Variable	Minimum	Maximum	Mean	Std. Deviation	Kurtosis
SAP	1.14	4.57	3.123	1.037	-.973
QIT	2.00	5.00	3.915	.854	-.174
MKT	2.00	5.00	3.894	1.042	-.953
STRG	1.33	4.67	3.111	.846	-.715
SKILLS	2	5	4.33	1.087	.017
PEU	1.25	4.50	2.922	.724	.444
CMPT	2	5	4.00	1.044	-.852
STRC	1.67	5.00	3.155	.903	-.844
SIZE	7.229	11.804	9.892	1.138	-.291

Table 4: Structural Equation Analysis Result on Governance Factors, Sustainability Accounting Practice, and Performance Driving Industrialisation

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
SAP <-						
QIT	.126	.114	1.10	0.269	-.079	.299
MKT	.447	.141	3.16	0.002***	.230	.724
STRG	.290	.107	2.69	0.007***	.060	.423
SKILLS	-.061	.078	-0.78	0.433	-.158	.103
PEU	.111	.100	1.10	0.270	-.031	.303
CMPT	.073	.090	0.81	0.419	-.147	.157
STRC (control)	-.050	.101	-0.50	0.620	-.180	.156
SIZE (control)	.205	.078	2.63	0.009***	.084	.352
----------+----------						
RMSEA p <= 0.05 LR test of model vs. saturated: chi2(124) = 513.69, Prob > chi2 = 0.0000						

****p value significant at 1%*

Table 5: Logistic Regression Analysis of Factors Affecting Sustainability Accounting Practice

Factors	B	S.E.	Wald	df	Sig.	Odds Ratio
QIT	1.047	1.070	.958	1	.328	2.850
MKT	2.188	1.209	3.276	1	.070*	8.918*
STRG	2.466	1.109	4.947	1	.026**	11.778**
SKILLS	-.332	.904	.134	1	.714	.718
PEU	.114	1.009	.013	1	.910	1.121
CMPT	.097	.958	.010	1	.919	1.102
STRC (control)	.087	.709	.015	1	.902	1.091
SIZE (control)	1.024	.792	1.675	1	.196	2.785
Constant	-32.294	13.301	5.895	1	.015	.000
Model Summary: Cox & Snell R Square = 0.545; Nagelkerke R Square = .737						

***p significant at 5%* **p significant at 10%*

Table 6: Quantile Regression Result on Corporate governance mechanisms Affecting SAP Implementation

VARIABLES	(1) SAP (0.10)	(2) SAP (0.20)	(3) SAP (0.30)	(4) SAP (0.40)	(5) SAP (0.50)	(6) SAP (0.60)	(7) SAP (0.70)	(8) SAP (0.80)	(9) SAP (0.90)
QIT	.201	.072	.067	.281*	.230	.252	.234	.094	.150
	(.255)	(.214)	(.185)	(.147)	(.146)	(.152)	(.157)	(.153)	(.169)
MKT	.171	.469	.566**	.325	.313	.343	.383*	.587**	.602***
	(.377)	(.347)	(.242)	(.268)	(.227)	(.223)	(.209)	(.214)	(.200)
STRG	.429	.385	.320	.342*	.361*	.329*	.335*	.280	.219
	(.374)	(.261)	(.206)	(.201)	(.212)	(.189)	(.191)	(.183)	(.192)
SKILLS	-.154	-.180	-.097	.076	.084	.048	.054	.027	-.117
	(.190)	(.178)	(.146)	(.153)	(.132)	(.110)	(.108)	(.102)	(.110)
PEU	.374	.188	.103	.142	.096	.103	.084	-.012	-.057
	(.241)	(.140)	(.126)	(.117)	(.116)	(.125)	(.121)	(.163)	(.207)
CMPT	-.074	.132	.111	.082	.087	.109	.116	.135	.191*
	(.279)	(.219)	(.229)	(.216)	(.159)	(.116)	(.105)	(.105)	(.096)
Control Variables									
STRC	.003	-.194	-.027	-.069	-.032	-.076	-.110	.002	-.030
	(.259)	(.200)	(.141)	(.161)	(.144)	(.149)	(.139)	(.146)	(.154)
SIZE	.421**	.290*	.171	.085	.124	.149*	.154	.132	.063
	(.183)	(.169)	(.143)	(.136)	(.114)	(.078)	(.092)	(.099)	(.120)
Constant	-4.597***	-2.997***	-2.391***	-1.979**	-2.164**	-2.309***	-2.316**	-2.019**	-.652
	(1.484)	(.948)	(.798)	(.918)	(.793)	(.675)	(.857)	(.961)	(1.118)
Pseudo R-squared	0.613	0.637	0.681	0.691	0.689	0.688	0.669	0.629	0.625

The coefficients are stated (standard errors are reported in parentheses)

****p significant at 1%* ***p significant at 5%* **p significant at 10%*

LIST OF FIGURES

Figure 1: Boxplot of Usage Rate of Sustainability Accounting Techniques

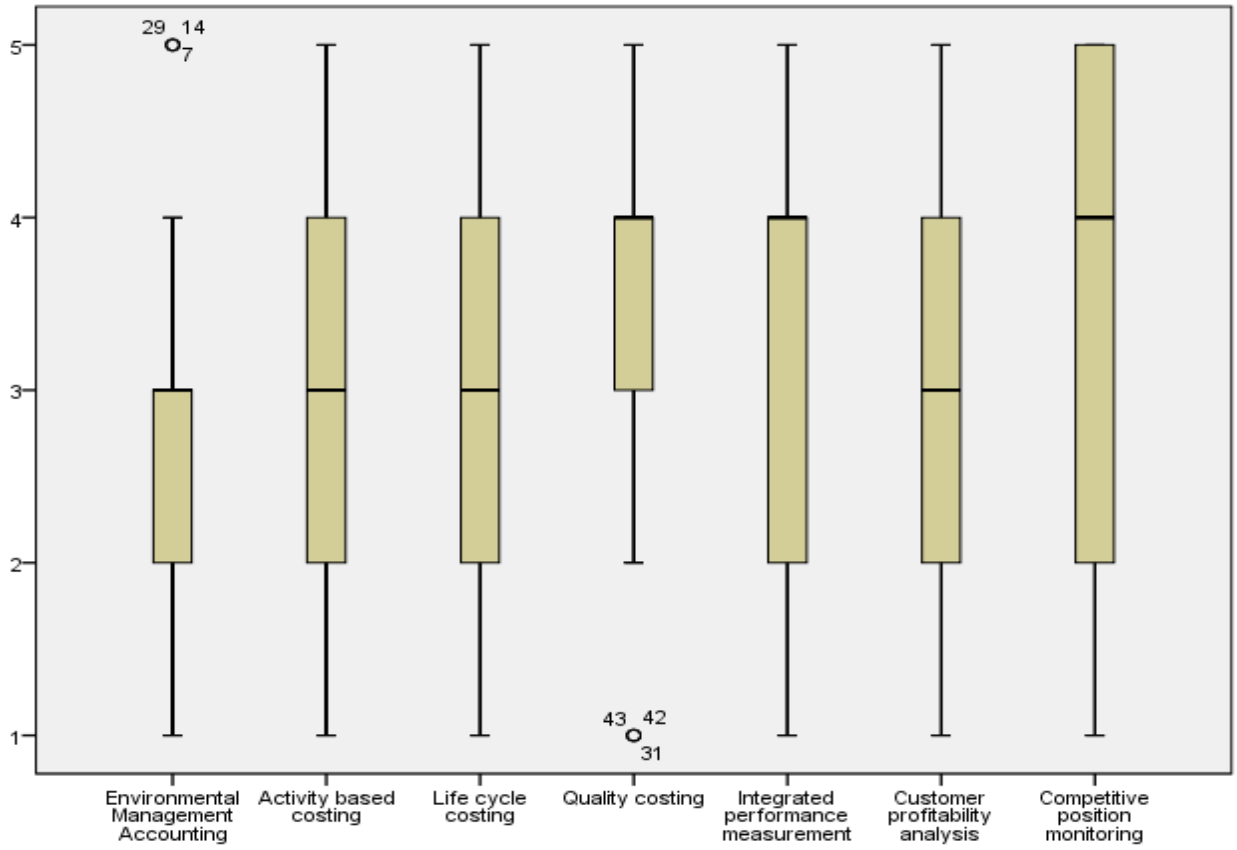
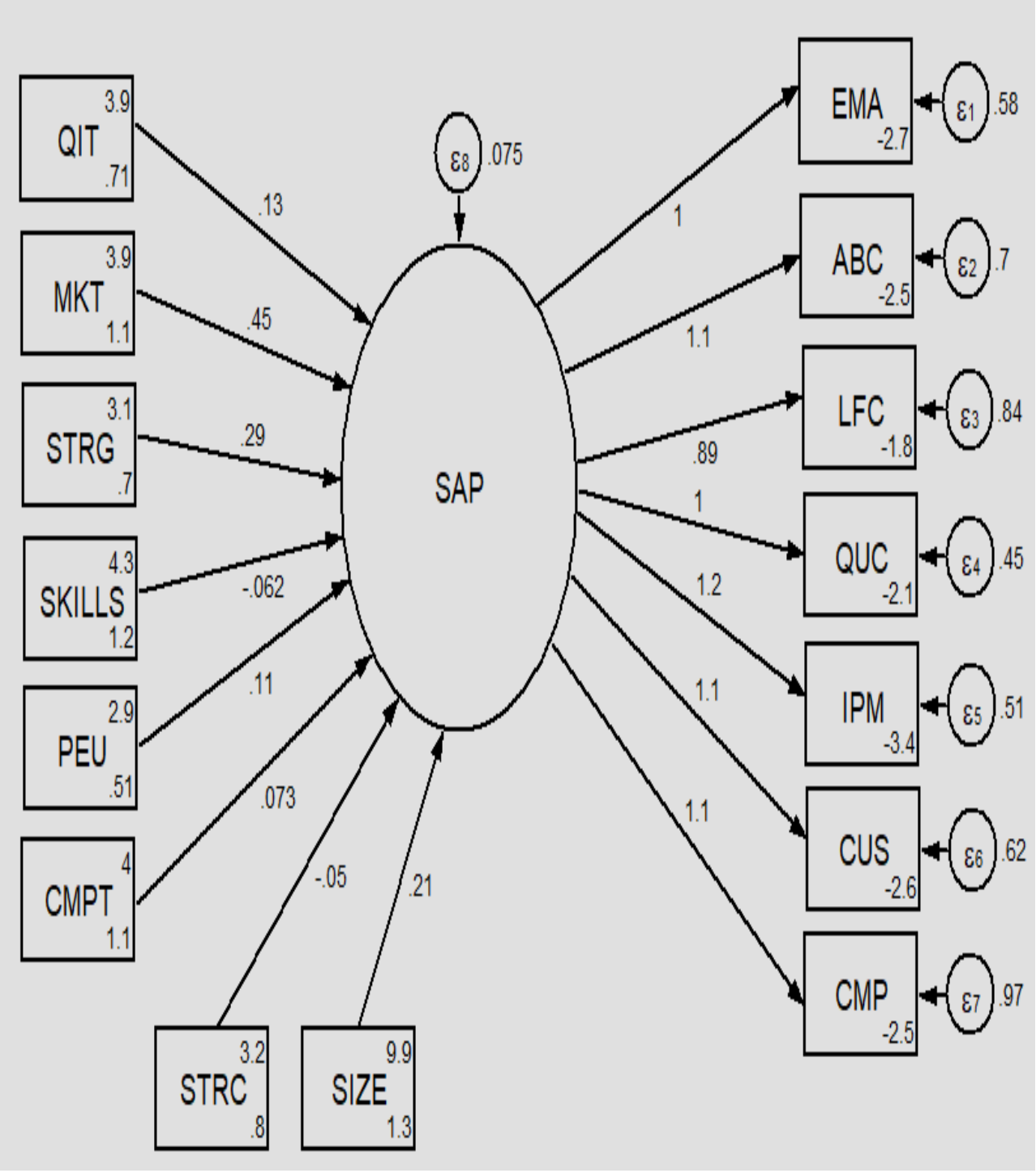
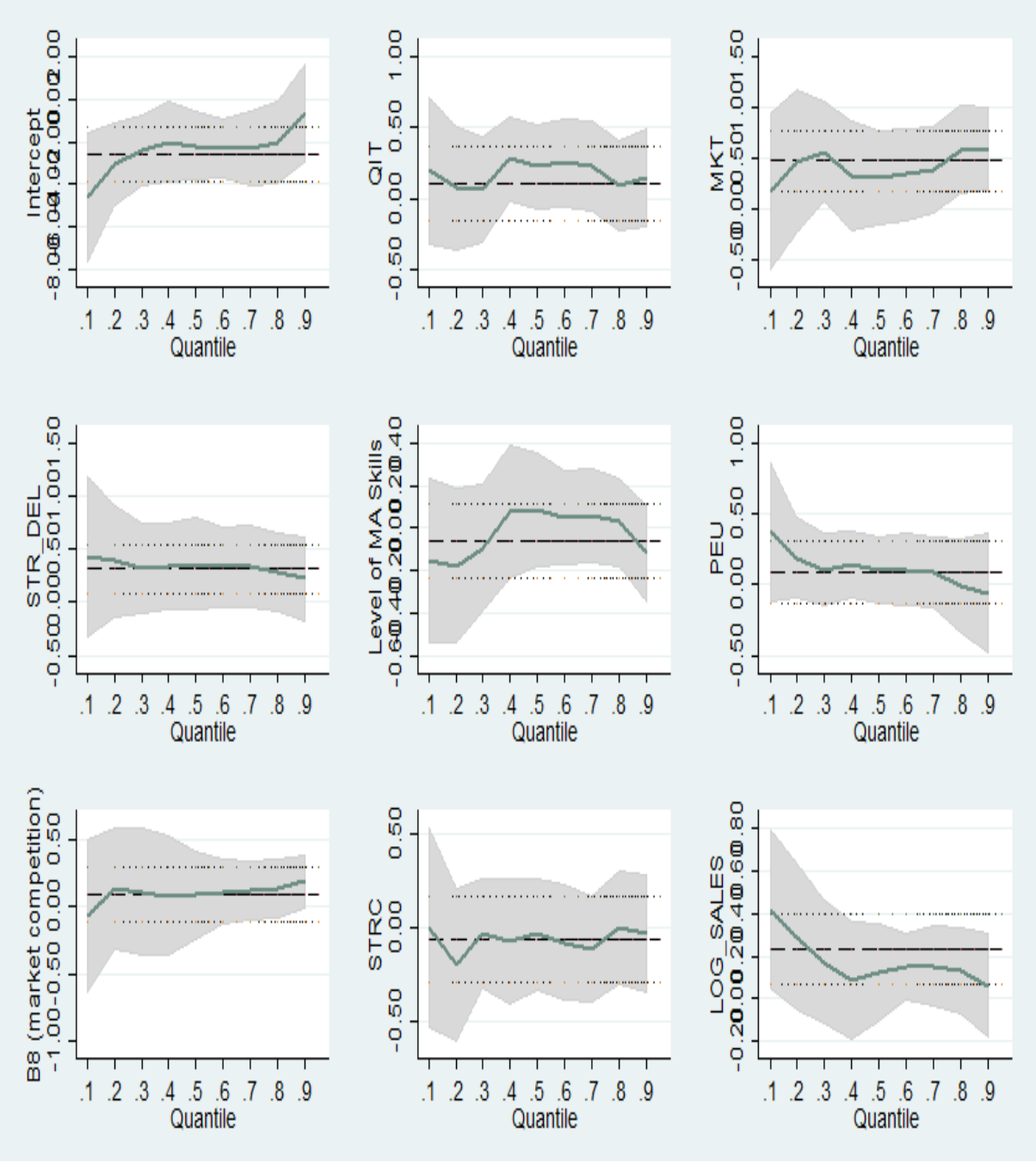


Figure 2: Structural Equation Modelling of Governance Factors Affecting Sustainability Accounting Practice



KEY: SAP = SAP Implementation; QIT = Quality of Information Technology; MKT = Market orientation; STRG = Deliberate Strategy-formulation; SKILLS = Structure of accounting department/ organisation of accounting skills; PEU = Perceived Environmental Uncertainty; CMPT = Intensity of Market Competition; STRC = Degree of centralisation or decentralisation (control variable); SIZE = Organisational Size (control variable); EMA = Environmental Management Accounting; ABC = Activity Based Costing; LFC = Life cycle costing; QUC = Quality costing; IPM = Integrated performance measurement; CUS = Customer profitability analysis; CMP = Competitive position monitoring

Figure 3: Quantile Regression Graph on Impact of Governance Factors on Sustainability Accounting Practice



APPENDIX 1: QUESTIONNAIRE

USAGE OF SUSTAINABILITY ACCOUNTING TECHNIQUES

To what extent does your organisation use the following sustainability accounting techniques?

KEY: Not at all = 1 Little extent = 2 Moderate extent = 3 Great Extent = 4 Very Great Extent = 5

S/N	ITEM	1	2	3	4	5
1	The practice of tracking, tracing and treatment of costs, earnings and savings incurred in relation to the company's environmental-related activities (Environmental Management Accounting)					
2	A two-stage procedure used to assign overhead costs to products. In the first stage, significant activities are identified, and overhead costs are assigned to activity cost pools in accordance with the way the resources are consumed by the activities. In the second stage, overhead costs are allocated from each activity cost pool to each product line in proportion to the amount of the cost driver consumed by the product line (Activity-based costing)					
3	The appraisal of costs based on the length of stages of a product's life including design, introduction, growth, maturity, decline and eventually abandonment (Life cycle costing)					
4	Calculating profit earned from a specific customer based on costs and sales that can be traced to a particular customer (Customer profitability analysis)					
5	A measurement system which focuses typically on acquiring performance knowledge based on customer requirements and may encompass non-financial measures (Integrated performance measurement)					
6	Prioritising quality by identification and control of the costs associated with the creation, repair and prevention of defects (Quality costing)					
7	The analysis of competitor positions within the industry by assessing and monitoring trends in competitor sales, market share, volume, unit costs, and return on sales (Competitive position monitoring)					

QUALITY OF INFORMATION TECHNOLOGY

Please rate your information system in respect of the following attributes

KEY: Very Low = 1 Low = 2 Moderate = 3 High = 4 Very High = 5

S/N	ITEM	1	2	3	4	5
1	Accuracy of information generated					
2	Precision of information					
3	Reliability of information					
4	Completeness of information					
5	Relevance of information generated for decision-making					

MARKET ORIENTATION

Please indicate the extent of the market orientation of your company

KEY: Not at all = 1 Low = 2 Moderate = 3 Large extent = 4 To a very large extent = 5

S/N	ITEM	1	2	3	4	5
1	My company has a strong understanding of our customers					
2	The functions in my company work closely together to create superior value for our customers					
3	Management in my organisation thinks in terms of serving the needs and wants of well-defined markets chosen for their long-term growth and profit potential for the company					
4	My company has a strong market orientation					

BUSINESS STRATEGY FORMULATION

Please indicate the extent to which you agree or disagree with the following statements in respect of business strategy

KEY: Strongly Disagree = 1 Disagree = 2 Indifferent = 3 Agree = 4 Strongly Agree = 5

S/N	ITEM	1	2	3	4	5
1	In our company, the strategic decision-makers usually think through everything in advance of strategic action					
2	In our company, strategic intentions are seldom realized with little or no deviation					
3	In our company, strategic action usually develops in the absence of strategic intention					

STRUCTURE OF ACCOUNTING DEPARTMENT **Please indicate how the Management Accounting Function is looked after in your organisation (please select one option)**		
S/N	ITEM	
1	There a separate Division/ Department/ /Unit to handle the work related to Management Accounting (assigned code 5)	
2	Each of the Functional Departments manages its Management Accounting needs (assigned code 4)	
3	The Management Accounting Function is overseen by the Financial Controller as and when the need arises (assigned code 3)	
4	Financial Accounting information is used for Management Accounting purpose by the Functional Departments (assigned code 2)	
5	There is no need for specific Management Accounting information (assigned code 1)	

PERCEIVED ENVIRONMENTAL UNCERTAINTY

Please indicate the extent to which measures are put in place by your organisation to monitor and predict the actions of the following stakeholders

KEY: Not at all = 1 Little extent = 2 Moderate extent = 3 Great Extent = 4 Very Great Extent = 5

S/N	ITEM	1	2	3	4	5
1	Customers					
2	Suppliers					
3	Competitors					
4	Government					

INTENSITY OF MARKET COMPETITION:

How frequent does your orgaisation assess the intensity of market competition in the sector you operate?

Not at all = 1 ☐ Rarely = 2 ☐ Sometimes = 3 ☐ Most times = 4 ☐
Always = 5 ☐

DEGREE OF CENTRALISATION OR DECENTRALISATION **Please indicate the degree of centralisation/decentralisation in your company** KEY: Not at all = 1 Low = 2 Moderate = 3 Large extent = 4 very large extent = 5						
S/N	ITEM	1	2	3	4	5
1	Level of power given to divisional managers /departmental Heads					
2	Level of independence accorded to branches/subsidiaries in making key decisions					
3	Degree to which responsibilities are shared to branches/ subsidiaries					

Appendix 2: Measurement of Variables

S/N	Variable	Acronym	Number of items	Source
1	Sustainability Accounting Practice	SAP	7	Cadez & Guilding, 2012; Ahmad & Zabri, 2015
2	Quality of Information Technology	QIT	5	Teng, Cheon & Gover, 1995
3	Market orientation	MKT	4	Al-Mawali, 2015
4	Business Strategy	STRG	3	Cadez & Gulding, 2012
5	Structure of Accounting Department	SKILLS	5	Self-developed
6	Perceived Environmental Uncertainty	PEU	4	Kren & Kerr, 1993
7	Intensity of Market Competition	CMPT	1	Hansen & Van der Stede, 2004.
8	Degree of centralisation or decentralisation	STRC	3	Self-developed
9	Organisational size (Total Revenue)	SIZE	1	Ahmad & Zabri, 2015

Appendix 3: Correlation Matrix of Variables Affecting SAP

	QIT	MKT	STRG	SKILLS	PEU	CMPT	STRC	SIZE	SAP
QIT	1								
MKT	.746**	1							
STRG	.430**	.640**	1						
SKILLS	.447**	.458**	.436**	1					
PEU	.197	.448**	.360*	.329*	1				
CMPT	.540**	.689**	.642**	.560**	.390**	1			
STRC	.498**	.728**	.416**	.409**	.462**	.522**	1		
SIZE	.507**	.514**	.335*	.624**	.332*	.481**	.466**	1	
SAP	.694**	.864**	.718**	.518**	.461**	.719**	.616**	.634**	1

***significant at 1% * significant at 5%*