

Firms' motives towards Sustainability adoption: a supply chain perspective from the manufacturing sector in Mwanza, Tanzania

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ABSTRACT

Despite our general knowledge on the potential creation of competitive advantage of firms by being environmentally responsive and socially responsible, coupled with the global emphasis through Sustainable Development Goals (SDGs), little empirical research exists on what motivates firms in developing countries to embrace sustainability along their supply chains. At the same time, while acknowledging the efforts made through research to document the outcomes achieved in the sustainability agenda in the developed west, the same falls short in developing countries. This paper attempts to explain the drivers of sustainability adoption among manufacturing firms in Mwanza, Tanzania. The data were collected from supply chain dyads comprising a sample of 106 firms in a mix of focal firms, first-tier supplier, and customer firms. Using a probit model, we find that relative advantage, compatibility and external pressure are the most influencing drivers for manufacturing firms' adoption of sustainability. We further found that supply chain complexity is negatively correlated and not a statistically significant contributor to sustainability adoption among the studied firms. We conclude that firms' internal factors are as powerful as external ones for sustainability uptake among studied manufacturing firms. Based on these findings, we provide policy recommendations before winding up the paper by presenting its limitations and directions for further research.

Keywords: sustainability, supply chain dyads, competitive advantage, manufacturing firms, sustainable development goals

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1. INTRODUCTION

Current global scholarly and professional discourses are mostly tuned towards sustainability as one of the key contemporary issues to be incorporated in industrial standard disclosures as part of credible business operations. Business firms are economic actors whose prime objective is to maximize wealth from their investments. For that case, they find themselves at the centre of the subject. This is partly because, over the last few decades, the world has witnessed a heightened level of competition in both supply and consumer markets whose demands are rapidly changing. Conversely, businesses are focal points due to globalizing supply chains that characterize current business trends. These supply chains have become strategic assets for competition as well as facilitation of both trade flows and exchanges globally. Yet, the modern business environment requires that successful businesses should not only get ready to confront disruptions posed by environmental phenomena such as climate change, pandemics such as COVID-19 as well as other natural disasters such as floods (Silva & Sehnem, 2022) but also act in a manner that lessens their magnitude of distortions. The post-COVID experience shows that businesses should be ‘nicer and more friendly’ to local areas where they operate, as it remains the only option for sourcing materials and selling products when distant markets are interrupted.

Curbing the adverse effects of such unprecedented events comes in multiple approaches, such as the adoption of new technologies, extending some society-responsive programs, and, as a long-term measure, refraining from environmentally harmful operations, depending on the crisis encountered. Such responses by businesses are not only beneficial to firms themselves but also to national economies at large. For example, by embarking on circular economy, firms are most likely to become resilient and efficient in the use of available resources while, at the same time, enabling the host countries to achieve one of the important SDGs – solving the problem of environmental degradation and global warming (Gabriel & Gauri, 2019).

To thrive, businesses constantly review their strategies and reorganise their supply chains to remain competitive (Paul *et al.*, 2022). This further calls for more active engagement in various remedial actions to simultaneously sustain their operations and make themselves relevant not only to their current and potential end markets but also other stakeholders (Zhu *et al.*, 2008). One important strategy is adopting sustainable supply chains (SSCS). The fundamental concept of sustainability is based on its three attributes – economic, environmental, and social concerns, which businesses should take into account during their

operations. Embracing the three aspects of sustainability is key to creating a competitive position by leveraging opportunities in the downstream and upstream supply chains (Saeed & Kersten, 2019). Research has indicated that firms from developed and developing countries adopt sustainability practices from varied perspectives, and the pace at which adoption happens differs. For example, Liu *et al.* (2019) and Saeed & Kersten (2019) maintain that firms from developed countries like Walmart have introduced social responsibilities into their supply chains because of informed customers and high environmental and labour standards in their country of origin. On the contrary, it has been maintained that developing country firms are less likely to be influenced by their less-informed customers to adopt sustainable practices. Still, coercive organs of governments can do it (Jia *et al.*, 2018). For example, Balda & Singh (2022) confirm that the Chinese Government is responsible for ensuring compliance with several Chinese firms' policies, laws, and regulations.

Studies in the agriculture sector have shown that firms are transforming their value chains to ensure sustainability in terms of social and environmental upgrading, not necessarily from being coerced by external forces, but through their coordination mechanisms (Hochachka, 2023; Benitez-Altuna *et al.*, 2024). The collaborative approach between buyers and producers has proved useful in resolving all potential risks posed by the prevalence of climate change. A good example has been provided by Benitez-Altuna *et al.* (2024), who emphasized that formal-contractual relationships between producers and buyers in Chile encouraged the adoption of sustainable agricultural practices (SAPS) along local food supply chains. Freidberg (2020) has concluded that the literature regarding food supply chains supports the idea that close-but-contractual dyadic relationships between farmers and buyers reinforce the adoption of SAPS.

A close look at the systematic literature review conducted by Saeed and Kersten (2019) presents a clear bipolarization of the global economic development status not only between developed and developing countries but also between various production sectors such as agriculture, tourism, transportation, and manufacturing between and within countries. Further, it is evident that sustainability studies in developing countries are scant due to the infancy of the sustainability agenda compared to those in the developed world. The differences also manifest in terms of research focus. While Northern researchers focus on matters such as carbon gases emissions, carbon footprint measures and private certifications as remedial actions for reducing impacts of both industrial and human-made greenhouse

gases (GHGs) and similar climate change-related risks (Wakamatsu & Maruyama, 2024; Tsutsumi *et al.*, 2024; Blanco, 2021; Boukherroub *et al.*, 2017; Jairo *et al.*, 2015), their counterparts in the South are still uncertain and lagging.

In other words, while the European Union (EU) has become an advocate of sustainability for many decades in alignment with UN 2030 agenda and the Paris Climate Change Agreement, there is yet no evidence in developing countries other than India, Brazil and China (Saeed & Kersten, 2019, p. 9) whether sustainability is a topical issue in policymaking and practice. Thus, empirical research is insufficient to substantiate their knowledge, willingness, and the extent to which national states and business firms have pursued sustainability practices in their business processes. Assuming the same is happening at the global scale would only be possible if all businesses fell under the same principles, quality standards, rules, terms, and conditions governing global value chains. Unfortunately, this is not the case as there are varied levels of economic advancement, just like there are for legal requirements and their enforcement regarding disclosure and reporting standards. From this standpoint, a mere categorization of China, India, Brazil, the US, the UK, Germany, Tanzania, or any other country as developing or developed does not warrant generalizability regarding current research direction and expected empirical findings on sustainability measures. The same is also not possible even within the developing or developed countries category, as readiness and pace to implement international agreements such as those made in Paris or Glasgow through the conference of the parties (COP) differ significantly. This is not only because of evident differences in how a specific country and its domestic firms and industries are inserted into global supply chains under prevailing market and economic conditions, but also due to obvious departures in the rules of the game and priorities between countries. This paper addresses the inadequacy of empirical literature in the South by examining the determinants of supply chain sustainability adoption among manufacturing firms in Mwanza, Tanzania. The manufacturing sector is focused because it is under more pressure to ensure implementation of sustainable practices than for other sectors (Saeed & Kersten, 2019, p. 9).

The significance of this study is twofold. First, the current academic scholarship in the supply chain management discipline highly focuses on sustainability as one of the necessary contemporary issues worth researching. In other words, the current study can make both empirical and practical contributions by moving *sustainability* as an emerging study agenda forward. This is much needed in the developing country context (Saeed & Kersten, 2019, p.

9) when considering sustainability not as a state but as a direction the manufacturing sector must take. Second, following the 2023 International Monetary Fund (IMF) report, which highlights the potential growth of the Tanzanian economy faster than most African countries, this study informs policy-making on the role of government towards nudging businesses for inclusive, sustainable growth. This study also responds to the need for real-time field data in general policy-making for government and businesses, if the desired economic growth is inclusive and sustainable. The dual (social and environmental concerns) are key to propelling firms' existence and competitiveness domestically and addressing one of the crucial international agenda items derived from the SDGS – ensuring the prosperity of future generations.

The rest of the paper is organized as follows: The next section presents the theoretical background and conceptual framework. In the third section, we present the methodology used to conduct the study. Section four presents the results, followed by a discussion of the findings in section five. In section six, we offer our concluding remarks regarding study limitations and recommendations for further research.

2. LITERATURE REVIEW

Theoretical approach

Several theories have been used in the literature to understand different perspectives on innovations. Such theories are used depending on the level of adoption and the context within which an innovation happens. Some authors, such as Hong *et al.* (2021), have recommended integrating more than one theory as they can better explain some specific situations in a unified context. From this background, this study used the innovation diffusion theory (DOI) because sustainability is considered an innovation when firms welcome and start undertaking other activities not directly linked to economic gains for which they were established. Such activities may involve minor or major changes in the products produced and/or the processes used in production. Those activities focused on benefiting the firm and its wider customer-society (Boukherroub *et al.*, 2017). DOI posits that the complexity of the innovation's origin, its compatibility with existing structures and context, the relative advantage or benefit it offers, its observability, and its trialability are the five attributes that have the most influence on whether an innovation gets adopted or not (Kumar *et al.*, 2021). The two characteristics of

DOI, trial-ability and observability, which are relevant in various scenarios for innovation uptake, have received little attention from researchers and have no direct relevance here.

Additionally, there are few prospects for innovation within the organisations to warrant trialability and observability. The dominant innovation attributes appearing in regular studies remain relative advantage, compatibility, and complexity pertinent (Agi & Jha, 2022; Kumar *et al.*, 2021). Relative advantage refers to any anticipated benefits the firm may receive from being ready to practice sustainability. Regarding the compatibility aspect, the reference is usually to look at the extent to which the new practice does not contradict the existing practices or, in other words, the level at which the old one can accommodate the new practice without any significant need for change. On the other hand, the complexity aspect looks at the difficulty the firm will need to exercise to undertake the newly introduced practice.

Furthermore, DOI focuses on the individual's attitude and behavioural perspective in any adoption of innovation processes at the firm level. The theory has inherent weaknesses as it does not consider factors happening in the firm's outside environment that might equally affect its operations (Lin *et al.*, 2020). To remedy the weakness, we complement it by bringing on board the stakeholders' theory that takes care of all influences that could emanate from outside the studied firms. This is so because of the knowledge that stakeholders such as customers, suppliers, the communities, and the government organs may influence what firms do. The theory provides three attributes: the power of influence, the legitimacy of the relationship, and the urgency of claiming. The theory describes the fact that companies produce externalities that affect stakeholders (internally and externally). Internal stakeholders include managers and employees, while external stakeholders include shareholders, suppliers, customers, Non-Government Organizations, business associations, or government authorities (Haleem *et al.*, 2022). This perspective is worth considering, as most studies on adoption have found that individuals and firms choose to adopt new ways of doing things due to being connected to agencies or local networks and associations (Baumgart-Getz *et al.*, 2012). The current study has considered the power of external influence, which we refer to as external pressure, and it is assumed that a firm's decisions are subject to external influence.

Empirical review and hypotheses development

A research framework was conceptualized mainly to examine the relationship between the four independent variables, relative advantage, business compatibility, Supply chain

complexity, and external pressure, and the dependent variable, sustainable supply chain adoption, as presented in Figure I.

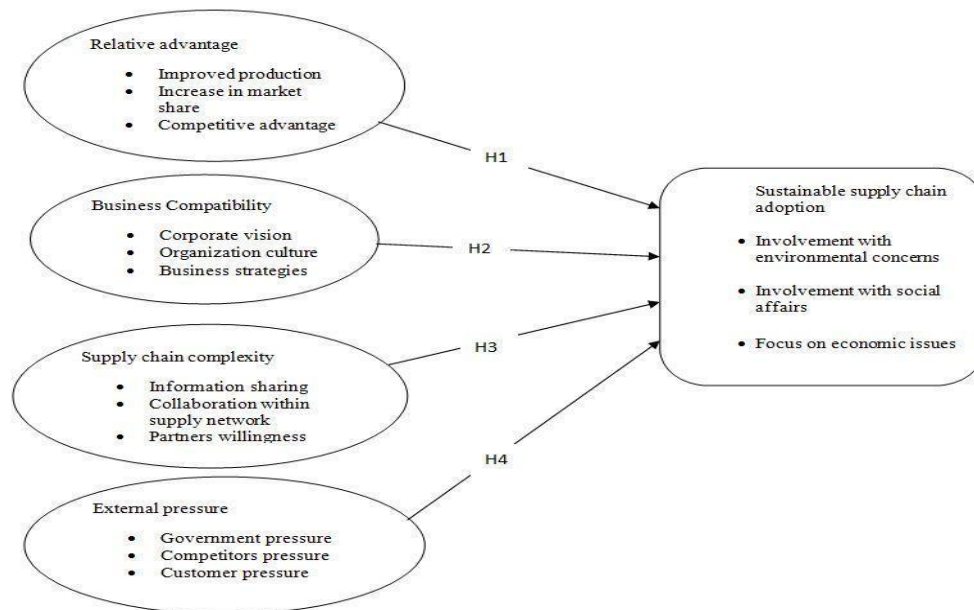


Figure I: Conceptual framework

Source: Researchers' formulation from literature review

Relative advantage and sustainable supply chain adoption

Relative advantage is conceptualised to be equivalent to perceived usefulness and performance expectancy. It is frequently found to be positively correlated with the uptake of innovations and to be a pioneer of the uptake of technology in the setting of supply chains (Alaskar *et al.*, 2020; Qader *et al.*, 2023). Perceptual benefits influence firms' sustainable supply chain management, such as increasing profit. Hong *et al.* (2019) found a positive impact on SSCM adoption. For example, Paul *et al.* (2022) (Qader *et al.*, 2023) studied Green Supply Chain Management (GSCM) and found that perceived relative advantage has a substantial role as a driving factor for adoption. Given the above, the following hypothesis was put forward.

H1: Relative advantage positively relates to sustainability adoption among manufacturing firms.

Adopting sustainable supply chains as a result of Compatibility

Compatibility refers to the consistency between the innovation and the organization's current beliefs, experience, and needs. Agi & Jha (2022) and Qader *et al.* (2023) have argued that a company seeks to incorporate innovation well-suited to its business practices, commitments, and type of work. Nilsson and Goransson (2021) argued that organisational culture represents its members' collective values, beliefs, and managerial philosophy, which facilitate achieving business goals. For example, the green initiative is more likely to be adopted if it is compatible with the firm's eco-friendly goals. The adoption is also more likely if the practice is consistent with the firm's thoughts about effective ways to promote environmental sustainability (Lin *et al.*, 2020). According to Alaskar *et al.* (2020), compatibility is the most significant factor in managers' decisions about adoption. Manufacturing firm decision-makers are likely to adopt and implement in their supply chain networks if they believe the adoption is well-matched with their current organizational culture and business practices. Hence, the following was hypothesized:

H2: Business compatibility has a positive relationship with sustainability adoption among manufacturing firms

Supply chain complexity and the adoption of sustainable supply chains

Supply chain complexity refers to the extent to which an organisation's supply chain consists of various elements that interact irregularly (Ateş *et al.*, 2022). Supply chains get more complex as companies develop new products, embrace current technologies, and expand their supply and consumer bases beyond firm boundaries. In addition, implementing sustainability in supply chain networks is affected by involving more actors and links between supply chain networks (Macchion *et al.*, 2020). Furthermore, complexity manifests itself in diverse ways at different levels of the supply chain, namely upstream, internal, and downstream. However, decisions made by focal enterprises add complexity at multiple levels. For example, when items, procedures, and schedules change frequently, the manufacturing process becomes more complex (Ates *et al.*, 2022). A focal firm's upstream complexity increases when it has several suppliers from different geographical locations, firm sizes, and varied organisational cultures (Chae *et al.*, 2019). Faasolo & Sumarliah (2022) argue that complexity significantly affects adoption. On the contrary, Qader *et al.* (2023) found a negative relationship between

perceived complexity as a driving factor for adoption. From the foregoing narratives, it was therefore hypothesized that:

H3: Supply chain complexity positively relates to sustainability adoption among manufacturing firms.

External pressure and the adoption of sustainable supply chains

External pressure refers to influences from the organization's surrounding business environment. Recent studies have shown that sustainability is caused by varied levels of pressure from stakeholders such as government, customers, and the wider society (Edwin *et al.*, 2022). To achieve supply chain sustainability smoothly, firms should be able to accommodate and work on stakeholders' pressure (Chand *et al.*, 2020; Asif *et al.*, 2020; Dai *et al.*, 2021). The literature recognizes the national differences that are so pervasive between developing and developed countries (Hong *et al.*, 2020; Jia *et al.*, 2018; Saeed & Kersten, 2019; Hwang *et al.*, 2016; Lin *et al.*, 2020), especially in terms of power that is rooted in awareness. For example, the literature shows that customers can dictate what businesses should and should not do in places where customers have power. On the contrary, businesses are more likely to be influenced by external pressure in areas where customer awareness is not high enough, and government organs do not protect consumers' rights. Therefore, this study hypothesized the following:

H4: External pressure positively correlates with sustainability adoption among manufacturing firms.

3. MATERIALS AND METHODS

The study obtained a sampling frame for manufacturing firms from the Mwanza Regional Secretariat's Office. From the list provided, 22 firms were randomly sampled as focal firms across several industries. Since the unit of analysis is *a supply chain*, we extended the sample size to include what we called '*supply chain dyads*', which included the first tier of focal firms' supply chains from both ends – upstream and downstream firms. This was the case because, from the supply chain perspective, innovations are believed to be initiated by powerful focal firms (hereafter manufacturing firms) and exported (diffused) to other chain players. Firms were selected based on the following criteria: first, they must have been operating for at least five years. This is due to the belief that adoption is a process that cannot be completed quickly. This is aggravated by the fact that most businesses in developing

countries are established with the major economic incentive. Therefore, it would take time before a firm considers the environment and social aspects equally important. Second, the number of employees must be at least fifty. This was because the study focused on medium and large manufacturing firms with formal structures whose visions and missions are clearly understood by their employees. Consequently, the focal firm's recommendation obtained two customer and two supplier firms through a purposive selection. In other words, each supply chain gave us five respondents (two from customer firms, two from supplier firms, and one from the focal firm). We ended up with a total sample of 106 firms instead of 110 due to the reason that one focal firm – which responded to our questionnaire, hesitated to recommend its supplier – and customer-firms due to its lack of confidence with researchers and because of research ethics, this was considered as a ‘no-consent’ case from which no data was collected.

The data were collected through a survey using a self-administered questionnaire. The questionnaires were distributed physically to focal firms’ representatives and followed up by phone calls to ensure completion and collection. Respondents from supplier and customer firms were contacted through phone calls (after being linked up by a focal firm representative). The questionnaire was emailed to them or left with the focal firm for collection. We also complemented our data by interviewing selected company executives and browsing companies’ web pages to capture company-specific information such as vision, mission, and strategic plans. The data were analyzed quantitatively through descriptive analysis and regression analysis. The Statistical Package for Social Sciences (SPSS) program version 20 was used for data coding and management, which were later imported to STATA 15 for the entire statistical analysis. Regression analysis through a probit model was used to analyse the quantitative data since the dependent variable – *sustainability adoption* – represents a binary choice. Probit regression was chosen for its strengths over the logit model, as the probit function gives the paramount result when extreme independent variables exist (Klieštík *et al.*, 2015). The qualitative information was analysed through thematic clustering around themes of interest.

Further, the choice for the probit regression was due to its strengths over logit model including (1) its simplicity in estimation unlike the cumulative distributive logistic function of the logit model which lacks quantified integral, (2) direct interpretability of the inverse linear transformation of probit as logarithms of chance, (3) in a multivariate setting, the probit function gives the best result when there is existence of extreme independent variables

(Klieštik *et al.*, 2015; Hahn & Soyer, 2005). If the probability of participation is given by P_i , then the cumulative normal distribution function can be expressed as:

$$P_i = E(Y = 1 | X_i) = \frac{1}{1 + e^{-z}} \dots\dots\dots (1)$$

Where $Z = \beta_0 + \beta_1 X_i$. Equation (1) can further be modified to:

$$P_i = \frac{e^z}{1 + e^z} \dots\dots\dots (2)$$

Given that the probability of adoption is represented by P_i , the probability of not adopting is derived from $(1 - P_i)$, which is given by the following equation: -

$$1 - P_i = \frac{1}{1 + e^z} \dots\dots\dots (3)$$

Dividing equation (2) by equation (3) gives the odds ratio $(P_i / (1 - P_i))$ which is given as;

$$\frac{P_i}{1 - P_i} = \frac{\frac{e^z}{1 + e^z}}{\frac{1}{1 + e^z}} = e^z \dots\dots\dots (4)$$

Applying the natural logarithm to the left—and right-hand sides of equation (4) to aid in estimating the model translates into equation (5), which was used to estimate the determinants of manufacturing firms' adoption of sustainable supply chains.

$$\ln \left[\frac{P_i}{1 - P_i} \right] = z = \beta_0 + X_i' \beta_i + \mu_i \dots\dots\dots (5)$$

Whereby z is a binary indicator for adopting taking the value of 1 if the manufacturing firm adopted sustainable supply chains and a value of 0 if not adopted, x_i is a bundle of firm level and firms characteristics (firm head age, sex, education, marital status, number of employees, and location of the firm) and institutional factors affecting manufacturing firm in adopting sustainable supply chains including (relative advantage, compatibility, supply chain complexity, external pressure).

4. RESULTS

Descriptive statistics

Some important basic parameters, such as the respondents' working experience, level of education, and sex, were described through descriptive statistics in Table I. Since adoption is a process that could take a long time, it was important to be assured of the reliable responses by those who have stayed longer working with the studied businesses. The level of education was considered important since the concept of sustainability is not common among laypeople, especially in developing countries. The respondent's sex was important to look at as males might differ from females regarding their feelings and decisions about promoting welfare to society and protecting the environment to safeguard future generations.

Regarding the working experience, results show that employees between 11 and 20 years accounted for 45.28% of the total sample size. Respondents who had worked between 21 and 30 years accounted for 27.36%, respondents who had worked for less than 10 years accounted for 20.75%, while 6.6% of respondents had worked with their businesses for 30 years or more. This distribution indicates that most firms surveyed had employees with enough working experience that assured a good memory of the path that their businesses had gone through. Similarly, 22 respondents had primary education, which is about 20.75%. Regarding secondary education, 29 respondents (27.36% had attained it, while the majority (55 respondents) had a University education, accounting for 51.89%. This distribution indicates that most respondents had adequate education for operating their businesses and providing sound responses on the research subject. Of them all, females were 31, 29.25%, while males were 75, accounting for 70.75%. These results imply that, like any other working station in Tanzania, males dominate the industrial positions more than females. The trend may also be attributable to the entrepreneurial character gap between males and females regarding business ownership (Tundui, 2012).

Table I: Demographic information of respondents

| Descriptive information | Frequency (N) | Percentage (%) |
|-------------------------|--------------------|----------------|
| | Working experience | |
| Less than 10 years | 22 | 20.75 |
| 11 - 20 years | 48 | 45.28 |
| 21 - 30 years | 29 | 27.36 |
| 30 years and above | 7 | 6.6 |
| Total | 106 | 100 |
| | Level of education | |
| Primary education | 22 | 20.75 |
| Secondary education | 29 | 27.36 |
| University education | 55 | 51.89 |
| Total | 106 | 100.00 |
| | Sex | |
| Female | 31 | 29.25 |
| Male | 75 | 70.75 |
| Total | 106 | 100 |

Source: Researchers' field data (2023)

Validity and Reliability of the Research Instruments

We tested the scales for consistency to ensure that all variables and sub-variables accurately measured the intended elements. Cronbach's alpha value was used to determine the reliability of the scale used in the study. The assumption that the higher the Cronbach's alpha correlation coefficient, the higher the reliability was fulfilled as presented in Table II. Cronbach's alpha is a measurement of the instrument's reliability used to illustrate the strength of the items in a set that have a positive correlation to one another (Balda & Singh, 2022). As presented in Table II, the dependent variable – sustainable supply chain adoption – had a score of 0.8363, and the predictor variables, namely relative advantage, had a value of 0.7737, business compatibility had a value 0.6324, supply chain complexity had a value of 0.6887 and external pressure had a score of 0.6284. This means there was internal consistency in the scales used; hence, the data used were reliable. This is supported by Maddala and Ellen (1989), who suggested that any alpha scores greater than 0.6 represent good reliability of the data under consideration.

Table II: Composite reliability test for each item

| Variables | Sub-variables | Number of Items | Cronbach's Alpha | Mean α Value |
|-----------------------------------|-----------------------------|-----------------|------------------|---------------------|
| Sustainable supply chain adoption | Environmental | 11 | 0.8363 | 0.8363 |
| | Economic | | | |
| | Social | | | |
| Relative advantage | Improve production | 3 | 0.9081 | 0.7737 |
| | Increase market share | 3 | 0.7262 | |
| | Competitive advantage | 3 | 0.6869 | |
| Business Compatibility | Corporate vision | 2 | 0.6778 | 0.6324 |
| | Organization culture | 2 | 0.5501 | |
| | Business strategies | 2 | 0.6694 | |
| Supply Chain Complexity | Information sharing | 2 | 0.7583 | 0.6887 |
| | Collaboration with partners | 2 | 0.6033 | |
| | Partners willingness | 2 | 0.7047 | |
| External pressure | Government pressure | 2 | 0.6799 | 0.6284 |
| | Competitors pressure | 2 | 0.6196 | |
| | Customer pressure | 2 | 0.5857 | |

Source: Output from field data (2023)

Regression analysis

The regression results in Table III show that the firm's relative advantage is positively related and statistically significant, with a coefficient of 0.2340 at a significance level of 0.05. Compatibility is also positively related to SSC adoption and statistically significant with a coefficient of 0.5423 at a significance level of 0.001. Furthermore, results reveal that external pressure considerably influences manufacturing businesses' adoption of SSC, with a coefficient of 1.0620 significant at 0.05. On the other hand, supply chain complexity is negatively related with a coefficient of -0.2600 but also not statistically significant at a p-value of 0.146. This means that this variable is not a predictor for SSC adoption. The pseudo-R-squared value of 0.3859 indicates that the independent variables included in the model explain about 39% of the variation in the adoption of sustainable supply chains among manufacturing firms in Mwanza.

Table III: Determinants for adoption of SSCS

| SSC_ adoption | Coefficient's |
|-------------------------|------------------------------|
| Relative advantage | 0.2340122** (0.0912360) |
| Compatibility | 0.5422991*** (0.09116041) |
| Supply Chain Complexity | -0.2600432* (0.10063910) |
| External Pressure | 1.0620035** (0.1974594) |
| _cons | 0.5500675** (0.7044991) |
| Number of observations | 106 |
| Pseudo R-squared | 0.3859 |
| Chi squared | 0.0000 |

* $p < 0.01$, ** $p < 0.05$, *** $p < 0.001$, Standard errors in parentheses.

Source: Researcher constructs (field data 2023)

The results imply that most manufacturing firms in Mwanza have adopted or are likely to adopt SSC to utilise the perceived benefits of SSC, such as increasing production, market share, and profit, thus deriving a competitive advantage. Regarding business compatibility, it has been found that once a firm's crucial components are compatible, such as corporate vision, business strategies, and organization culture, it becomes easier for the firm to adopt SSC practices. Almost all organizations, including manufacturing firms, work hard to achieve their goals and objectives. So, if pursuing and achieving their predetermined visions entails embarking on sustainability requirements, they can easily adopt them. Regarding external pressure, results imply that the government requirements, charges, and fines imposed on manufacturing firms, competition from other manufacturing firms, and customer requirements have greater influence on a firm's decision to adopt SSC. On the other hand, supply chain complexity is not a significant determinant of SSC adoption. This suggests that this factor does not play a significant role in the decision-making process for adopting sustainable supply chains among manufacturing firms.

Hypotheses testing

Hypotheses were tested, and results are presented in Table IV. As depicted in the table, hypotheses 1, 2, and 4, represented by H1, H2, and H4, were significant and supported at p-values of 0.05, 0.001, and 0.05. However, H3 was negative and insignificant at a value of 0.146; hence, it was not supported. These results indicate insufficient evidence to accept the null hypothesis that relative advantage, business compatibility, and external pressure do not

influence the adoption of sustainable supply chains among manufacturing firms. However, we accept the null hypothesis that supply chain complexity does not influence the adoption of sustainable supply chains among manufacturing firms in Mwanza.

Table IV: Hypothesis testing

| Hypotheses | Coefficients | P-Value | Status |
|------------|--------------|---------|---------------|
| H1 | 0.2087661 | 0.000 | Supported |
| H2 | 0.5520892 | 0.000 | Supported |
| H3 | -0.8205621 | 0.146 | Not supported |
| H4 | 1.3995627 | 0.007 | Supported |

Source: Researchers' analyses output from field data (2023)

5. DISCUSSION

Our findings indicate that the three variables- compatibility, external pressure, and relative advantage- are true predictors for firms' adoption of sustainable supply chains. In essence, compatibility and relative advantage are internal factors, while external pressure represents factors exerted from outside the firm. On the one hand, an interpretation of these findings could hold that firms adopt sustainable practices as a function of their internal motivation crafted within their founding principles. Relative advantage portrays a positive perception that firms need increased market share, production, and sales turnover. Because firms would like to experience positive metrics, they find themselves moved towards embracing sustainability practices in anticipation of enjoying such benefits. In other words, firms would find it difficult to initiate such sustainability practices and get them embodied by their suppliers and customers along the chain if they perceive that by so doing, it increases their operating costs while eroding their profits instead of the opposite. These findings are in harmony with earlier studies on adoption uptake. For example, studies by Agi & Jha (2022), Alaskar *et al.* (2020), Asamoah & Nadarajah (2020), Hong *et al.* (2019), Lin *et al.* (2020), Paul *et al.* (2022), and Qader *et al.* (2023) found that firms that pursue sustainability along their supply chains had their production levels improved, market shares expanded, profits increased, and created competitive advantage positions in their respective industries. Business firms are willing to implement sustainability given their economic payback and better performance in the future. To cement the matter, one of the focal firms in the study – Nyanza Bottling Company, which produces cold drinks, had the following on its web page:

'Corporate social responsibility increases competitive advantage, protects and raises brand awareness and builds trust with customers and employees through profit sharing'. From this statement, it is reasonable to argue that firms recognise the importance of pursuing social, economic, and environmental aspects due to their positive perception on increased production, market share and competitive edge, as well as raising brand awareness, mitigating firm risks and building trust with their existing and potential customers and suppliers.

The fact that business compatibility has the strongest influence among other variables provides three viewpoints for discussion. First, firms are skeptical about embarking on something that requires a massive twist of their business focus, but are open to something closely related to their current work. Second, firms whose visions, strategies, and organisational cultures are futuristic in their orientations are more likely to adopt sustainable supply chains than those that are not. This means entrepreneurial ventures whose owners don't intend to operate for a long time but would like to run them and exit are less likely to be adopted if huge changes are anticipated. Third, firms will adopt sustainability relatively easily if it is internally driven rather than when imposed from outside. In that vein, organisations are less likely to embrace sustainable supply chains if they believe that sustainability is an external agenda item and somehow incompatible with their current state of affairs, as its implementation would be challenging, expensive, and unlikely to produce the intended results. This observation is in line with Qader *et al.* (2023), Alaskar *et al.* (2020), Asif *et al.* (2020), and Nilsson & Goransson (2021). Interestingly, the finding departs from the general claim that firms in developing countries are less likely to adopt such practices unless there is coercion from the government. For example, out of 22 manufacturing firms, 7 (31.8%) indicated on their webpages that sustainability is an uppermost significant intentional issue, which has been embraced in their strategic reports. The same was also evident during face-to-face interviews held with the Human Resource Manager at Nyanza Bottling Company Ltd., who had the following to say: *'The organization's strategies and our vision are driving us to sustainability'*. This statement indicates that some firms' top managements know the importance of sustainability and is ready to support the initiative because it has been incorporated into their visions and business strategies. The awareness attribute, though not included in the DOI theory, was used by Qader *et al.* (2023) to study the adoption of Halal Supply chains in Pakistan. They found it significantly influential in the adoption process.

External pressure is the second most decisive factor in adopting sustainable supply chains. The main aspects considered were government laws and regulations, competition, and customer requirements. This is not surprising because sustainability issues, such as how communities deal with the environment and businesses give back to society, are now prominent in political and government platforms in Tanzania. The government has established the National Environment Management Council (NEMC) to ensure that all firms comply with set environmental standards.

It is also important to note that with the liberalization of the economy and the current focus on private sector participation through foreign direct investments, competition among businesses is scaling up in the country. In return, this competition forces firms to undertake activities that give them a competitive edge. However, as opposed to our expectations, there was no indication of the government's supremacy over other factors. Instead, competition and customer requirements were evident and consistent with a study by Edwin *et al.* (2021). Therefore, it is reasonable to argue that business firms not only react to sustainability encounters through compliance and risk mitigation methods but also pursue sustainability issues as business opportunities and sources of competitive gains at different scales.

Some previous studies have also indicated that even in the same country where similar contexts are assumed, there are varied pressure levels towards adopting sustainable supply chains. For instance, differences are observed across industries and markets (Jia *et al.*, 2018). A good example is provided in this study by comparing firms in the fisheries sector, which are relatively more strongly linked with foreign buyers in Europe through global supply chains, against other firms in other industries, which are strongly linked to local customers. While European buyers have more influence and exert much power on Tanzanian firms to comply with sustainability practices or lose their market, the same has been observed from other firms in other industries where customers, coupled with local competition, are equally influential. This finding is interesting as it demonstrates that either directly or indirectly; customers from developing countries can equally influence manufacturing firms to adopt sustainability practices. This also manifested in interviews with Victoria Polybags Ltd.'s Compliance Manager, who said, '*Government forces do not drive our firm to sustainability, but rather it is competitors and customer pressure that matter the most*'. This statement is also consistent with a study by Hwang *et al.* (2016), who argued that firms that see their

competitors flourishing by addressing environmental issues frequently begin tackling them through emulation.

Contrary to our expectations, but consistent with Qader *et al.*'s (2023) findings, supply chain complexity is a negative and insignificant determinant for adopting sustainable supply chains among Mwanza manufacturing firms. We had expected supply chain management issues in the study setting to be less complex because of the proximity of the supply chain configuration to which we opted to confine our data sources. This would make the variable significant and the adoption process easy, according to the DOI theory. Our findings may be attributable partly to our sample selection, as it only involved first-tier suppliers and customer firms of the supply chains. Previous scholars have argued that violation of environmental and social practices begins with the second and third-tier suppliers (Govindan *et al.*, 2020). This means limiting our sample to the first-tier configuration is not complex enough to make the factor significant. However, the negative sign is suggestive that the more complicated the supply chains continue to be, the less likely it is for chain actors to adopt sustainability. This finding appears weird because it is not significant. However, it is consistent with previous claims in the literature that manufacturing firms may encounter supply chain complexity as their supplier networks expand or encompass a broader supply base, which could influence the adoption status. For example, in some studies conducted in developed countries where the sample selection penetrates deeply into the supply chain complexities, there is a negative correlation which suggests that the higher the complexity of supply chain the difficult it becomes for firms to adopt sustainable supply chains (Ates *et al.*, 2022; Chae *et al.*, 2019 and Chand *et al.*, 2020).

On the contrary, Macchion *et al.* (2020) and Yin & Ran (2022) favour increased supply chain complexity, as this might activate firm innovation. There is a positive relationship between supply chain complexity and innovation adoption, which again contradicts our findings in this study. This confirms the inconclusive and mixed results in the literature regarding this variable.

Moreover, complexity is not an issue because the manufacturing enterprises assessed in this study deal with only a few nearly identical customers and suppliers that have neither distinct requirements nor are located in different geographical locations. There is also a lack of interdependence between suppliers, customers, and focal firms. This might be due to the nature of the market structure in the country (i.e., steady and foreseeable demands). Further, we also partly associate the finding with the dominance of informal business practices in

most manufacturing sectors in Tanzania where buyers and suppliers are not necessarily strongly linked in the way they operate their businesses unlike in the developed world and other sectors such as agriculture where formal contracts exist and bind players together in honour of the contract (refer Freidberg, 2020 and Baumgart-Getz *et al.*, 2012).

6. CONCLUSION AND POLICY RECOMMENDATIONS

This paper concludes that almost all manufacturing firms in Mwanza that were included in this study had adopted sustainability along their supply chains. Unlike previous studies that claim superiority of either internal or external drivers, this study concludes that both internal and external drivers to sustainability adoption appear to have equal weight, as it is either customer requirements or competition pressure on the one hand and compatibility and relative advantage on the other that have influenced adoption. Firms no longer pursue sustainability just to comply with government regulations. Still, they prefer goal alignment with new global trade development trends that call for reevaluation and pursuit of more encompassing corporate citizenship goals, amongst which being sustainable is imperative. In so doing, their supply chains become socially responsible, environmentally friendly, and legally compliant, eventually gaining competitive advantages in the market.

From the foregoing conclusions, three policy recommendations emerge. First, the legal framework guiding the industrialization process in the country should focus on encouraging firms to ensure that business strategies and organizational cultures devised at the firm level are aligned with sustainability practices right from their inception, rather than demanding they comply with seemingly imposed directives at a later stage. This will not only make them corporate citizens who are socially and environmentally responsible but will also help them become competitive and attractive to global chains. For this to succeed, the regulatory machinery should also think about incentivizing firms that embrace sustainability. We have seen that they easily adopt when their actions are backed up with benefits in return. Second, it is recommended that regulatory enforcement about sustainability adoption should focus on industry-specific characteristics since the demands for adoption and determinants for the same differ across industries. Third, policy implementation should not only be directed to confront businesses themselves, but the same policy objectives could be channeled through creating more awareness on the importance of sustainability practices among customers and empowering them through stringent consumer protection laws. More customer awareness and

high consumer protection will eventually accumulate relative powers for customers to influence manufacturers to set up priorities for future operations, including sustainability matters.

Recommendations for further research

While acknowledging this study's good picture it portrays, it might seem exploratory due to how its sample was constituted. The use of a handful of firms drawn from across industries makes the findings difficult to generalize with certainty. We thus recommend that further studies should disaggregate the firms and study them in respective industries to benefit from industry-specific characteristics that could unveil specific findings relevant for generalizability. This study is also limited in explaining the extent of adoption each firm or specific industry has reached. Future studies should focus on that direction to understand the pace at which adoption happens and the associated reasons to explain the notable variations across industries, if any.

Declaration of conflict of interest

Authors declare that they received no funding and thus have no conflict of interest regarding this manuscript.

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