A decision support framework for socially responsible supplier selection in the Nigerian banking industry

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Abstract

Design/ Methodology/ Approach: A novel integrated decision support methodology composed of Shannon Entropy and TODIM methods is introduced. The Shannon-Entropy approach is utilized to estimate CSR factor weights, and TODIM is used to rank the suppliers, with the process completed in a group decision setting.

Purpose: Sustainability trends have changed the modus operandi in businesses even as the market environment becomes more socially conscious. However, relatively little research has been conducted on integrating social sustainability aspects with a focus on Corporate Social Responsibility (CSR) into the selection of suppliers in the service sector particularly the banking industry. In this paper, we propose a CSR decision support methodology to evaluate and prioritize socially responsible suppliers.

Findings: A Nigerian bank was used as a case study to test and show the usefulness of the CSR-based decision framework in evaluating and selecting socially responsible suppliers. The results show the topmost ranked suppliers that are recommended for future negotiations by the case (bank). The study will enable banks to select socially responsible suppliers which could accelerate the attainment of sustainability objectives, protect their reputations, and improve competitiveness.

Originality: This study pioneers the application of a novel decision methodology based on Shannon Entropy and TODIM in selecting socially sustainable suppliers in the Banking sector of an African emerging economy-Nigeria.

Keywords: Sustainability; Supplier selection; Corporate social responsibility; Service sector.

1 Introduction

Researchers in the area of supply chain management have shifted their focus from issues related to economic and environmental sustainability to integrate socially inclined issues (Feng et al, 2017; Wang, 2021). Generally, the quest to achieve social sustainability is heightened among firms, even as these firms strive to rethink their modus operandi in order to increase their competitiveness. The banking firms are not left out in this struggle. In fact, banks hold a unique intermediary role in sustainable development, and this has become hyped up due to the 2008 financial crisis (Yip and Bocken, 2018). Clearly, the crisis exposed the business policies of the banking industry around the world and pinpointed inefficient business sustainability practices as the cause of financial

deterioration (Jan et al, 2019). Moreover, banks consistently strive to implement value-adding services due to their highly competitive market environment and their undifferentiated products (Reguera-Alvardo et al, 2016). Indeed, actualizing sustainability objectives is highly critical in banks due to the major role that the banking sector plays in the continuous growth of the economy (Aras et al, 2018). Sustainability objectives in banks could be in the form of investors' desire for sustainable responsible investing (SRI) or corporate management's focus on corporate social responsibility (Nizam et al, 2019).

Currently, there is a growing interest in CSR, both in the professional and academic fields and its activities have a way of contributing directly or indirectly to the sustainability of the whole society (Siueia et al, 2019). CSR is a form of corporate self-regulation with no current specific definition but broadly defined as a strategy which encourages the management of social activities in organizations and proposes that firms have responsibilities towards a broader group of stakeholders in conjunction with their traditional financial responsibilities to stakeholders (Panda et al, 2017). CSR is now part of companies' non-economic agenda, with moral, ethical, and social implications that promote mutually beneficial relationships between an organization and its existing and potential publics (Ozdora-Aksak and Atakan-Duman, 2016). Furthermore, many scholarly articles portray CSR as a socially responsible strategy which includes corporate citizenship, business ethics, corporate environmental sustainability and corporate financial performance (Moktadir et al, 2018). Indeed, implementing CSR as a social sustainability strategy can enhance companies' reputations, risk management, customer loyalty, non-governmental response, and finally credibility among stakeholders (Nermatollahi et al, 2017). Particularly, the importance of building and managing a reputation in the service sector is high due to the intangible nature of the product and the need to build trust among stakeholders (Fatma and Rahman et al, 2016; Ruiz and Garcia, 2021). Consequently, within the last two decades, banks have focused on adopting CSR strategies to build good reputations in addition to fostering altruistic and ethical motives. Clearly, the engagement of the banking sector in non-socially responsible practices such as interest manipulation, subprime mortgages, and other toxic banking products has adversely affected employee and consumer perception (Esteban-Sanchez et al, 2017). In this context, banks are consistently being pressured by civic society groups regarding the role that they play in undermining human rights and adversely impacting on local communities through their indirect influence on the businesses that they finance (Panda et al, 2017).

Moreover, purchasing practices are a crucial component of an organization's success and strong supplier relationships focusing on CSR activities can improve organizational efficiency (Knight et al, 2017; Wilhelm et al, 2016a, b). Consequently, supplier selection represents a strategic and complex managerial decision- making problem (Almasi et al, 2021; Giannakis et al, 2011; Govindan et al, 2018; Mondragon et al, 2021; Xiao et al, 2019). In fact, suppliers are becoming an integral part of a bigger value chain network and, many a time, unethical actions of suppliers impact the corporate image and

business significantly (Mani et al, 2014; Mani et al, 2016). Likewise, the sourcing process is usually tedious due to the pressures on purchasing managers to simultaneously consider the views of the society and the opinions of all stakeholders, to stay profitable and to create a supportive business strategy (Dubey et al, 2017; Dubey et al, 2019; Giannakis et al, 2020; Govindan et al, 2018). As such, the managers can overcome these pressures through implementing sustainable supplier selection based on CSR practices. Supplier-related CSR practices are essential to ensure sustainability as firms cannot be more sustainable than their suppliers and irresponsible suppliers' behavior is reflected in the buying firms' reputation (Haleem et al, 2017). Notably, developing nations are highly characterized by a lack of efficient measures to manage sustainability-related problems and wide socio-economic differences between buyers and suppliers (Ding et al, 2017; Mani et al, 2018; Song and Li, 2019; Yawar and Seuring, 2018). In fact, most suppliers in developing countries do not operate on a large-scale level due to scarcity of resources, thus preventing them from paying attention to social issues (Mani et al, 2016; Moktadir et al, 2018). Also, there has been an increase in income levels in developing countries and consumers are beginning to demand for socially responsible sourcing from buying firms/ suppliers (Mani et al, 2014). Yet still, there is a dearth of published studies on socially responsible supplier selection based on CSR in extant literature and even the available studies on the theme concentrate on developed countries (Sharif et al, 2017; Sobhani et al, 2012). Thus, studying socially responsible supplier selection based on CSR in developing countries like Nigeria is essential to gain a better understanding of sustainable development.

In particular, the Nigerian emerging market holds significant opportunities for the banking sector to consciously incorporate CSR initiatives in supplier selection. Over the years, scholars have continued to pontificate on the degree to which CSR is a necessary tool for Nigerian banks to establish a productive and symbiotic relationship with their stakeholders and the communities where they operate. This stems from a history of strained relationship between Nigerian banks and their stakeholders following bank failures which often subject the stakeholders to great losses (Odetayo et al, 2014; Timipere et al, 2020). And as regards the banks themselves, scholars generally agree that involvement with CSR will earn them advantages that will enhance their sustained productivity. In this regard, Odetayo et al, (2014) argue that investment in corporate social responsibility by banks has a positive impact on their profitability. This resonates with the claim of Achua (2008) that CSR is the foremost condition for banking stability in Nigeria. Achua supports his claim by pointing out different areas of the banking sector where the practice of CSR is needed for improvement of profit, trust and public perception. For instance, the revocation of 50 banks' licenses between 1994 and 2006, and subsequent closure of 13 out of the remaining 25 banks as a result of negative shareholders' funds and inability to find merger partners or acquirers were indicators of poor CSR practices. He also reveals the incidence of corporate prostitution by banks. In another instance, Adeleke (2014) asserts that CSR is necessary in the Nigerian banking sector since Nigerian banks operate in a climate of endemic

corruption within which corporate governance is poor. According to this author, the degree of corruption within most Nigerian banks, as illustrated by practices such as the submission of false returns to regulatory authorities and the carrying of second-rate banking portfolios, is an indicator of poor CSR. This is corroborated by Babajide et al, (2020) who assert that Nigerian banks and bank officials engage in non-compliant practices such as not upholding the Know-Your-Customer (KYC) principles.

Furthermore, the study of Lawal et al, (2018) suggests an insight into the level of CSR involvement by Nigerian banks. They established that the level of Nigerian banks in CSR involvement was not significant (Z-test = 0.0285; (p-value > 0.05), while host communities generally thought that CSR implementation by the banks was low. Achua (2008) asserts that this phenomenon can negatively impact the stability of these banks since it can damage the symbiotic relationship between them and their host communities. Furthermore, the need for CSR in Nigerian banks becomes clearer when weighed against the history of bank failure in Nigeria which has been attributed to weak corporate governance, declining ethics, and fraudulent practices among others (Timipere et al, 2020). Timipere et al, (2020) traced the history of bank failure in Nigeria back to 1930 when all indigenous banks, except the National Bank, failed; again, in the 1940s all but four indigenous banks were liquidated; also, between 1952 and 1954 16 out of 21 indigenous banks failed and in the 1990s 26 banks failed yet again. Therefore, the Nigeria banking sector is in need of better ethics, accountability and transparency, which are the objectives of CSR (Adeleke, 2014). As a result, there have been past studies on how to integrate CSR into the Nigerian banking sector (Oyewumi et al, 2018). Yet, a research gap remains on how the banking sector in Nigeria, just like in most developing countries, can effectively implement socially responsible supplier selection based on CSR initiatives. This study exists to fill this gap. Hence, this study aims to answer the following research question, "How can a decision support framework be developed for the selection of socially responsible suppliers in the Nigerian banking sector? In this context, this study serves the dual outcomes of (a) developing an effective modeling technique based on Shannon Entropy and TODIM (TOmada de Decisão Interativa e Multicritério – in Portuguese; "Interactive and Multi- criteria Decision Making" in English) that is suitable for evaluating and ranking suppliers in the banking sector and (b) proposing research implications that will serve as a foundation for research into the implementation of the selection of socially-responsible suppliers in developing countries, especially Nigeria.

To achieve the above stated objectives, this study developed a CSR framework based on literature review and refined it with the assistance of experts from the banking industry. This framework was then applied to evaluate and prioritize socially responsible suppliers with the help of a novel integrated decision support model composed of Shannon-Entropy and TODIM. The study determined the optimal socially responsible suppliers by evaluating and ranking these suppliers based on their performance with respect to social responsibility. In doing so, TODIM was deployed to handle the decision-making process.

TODIM is a modeling technique that considers the behavioral expectations of an investor by taking into account prospect theory and can be considered simpler, easier to apply and more comprehensible for practitioners than other multi- criteria decision- making models (Alali and Togla, 2019; Singh et al, 2021; Tian et al, 2021). In determining the rankings, however, TODIM requires considerably more input information such as the comparative weights of the CSR criteria. This additional necessity restricts the utilization of TODIM. Shannon-Entropy was used to deal with this challenge. Shannon entropy, which is a modeling technique that serves as a criterion for the degree of vagueness depicted by a separate probability distribution, presents an estimation of the initial contrasts between data sets and provides insights on the intrinsic mean of the statistics moved to the decision maker (Fedajev et al, 2020; Maghsoodi et al, 2018; Miranda dos Santos et al, 2019). Shannon-Entropy can effectively address TODIM's additional input requirement and enables the avoidance of the need for additional data collection in determining these weights (Hong et al, 2021; Karagiannis and Karagiannis, 2020). Shannon-Entropy can generate the relative weights. A single dataset is used to determine the CSR criteria weights and rank the suppliers. Thus, this minimizes the heavy reliance on and involvement of decision-makers in completing a series of questionnaires (Saraswat and Digalwar, 2021). This multi-stage methodology can more effectively handle the problem of the evaluation and selection of socially responsible suppliers by considering decision-makers behavior via the prospect theory. Shannon-Entropy therefore helps to make TODIM a more complete and effective application. The integration of the Shannon-Entropy and TODIM methodologies aids in lessening the inputs from, and the interactions of decision-makers. The Shannon-Entropy based TODIM methodology was applied in the evaluation and prioritization of suppliers based on certain CSR criteria with the focus on the banking sector. This study pioneers the utilization of the Shannon entropy - TODIM approach to prioritize the most efficient and socially sustainable supplier from a pool of suppliers for banking system sustainability. The application of the proposed methodology to the Nigerian banking sector is instrumental to the development of the country and demands investments in CSR practices (Oyewumi et al, 2018).

The remainder of this paper is organized as follows: the literature that is relevant to the subject matter of this study is reviewed in Section 2. Embedded in Section 2 is a brief on CSR practices in procurement in the banking industry. In Section 3, the solution methodology is presented. A practical case application using the proposed CSR framework supported by the novel integrated decision-making tools, and sensitivity analysis are provided in Section 4. Discussion, and academic and managerial implications of the study are presented in section 5. Section 6 concludes the study by identifying the limitations and opportunities for further research areas.

2 Literature Review

2.1. CSR procurement practices in the banking industry

In recent times, firms have consistently strived to address environmental and social issues and this is exemplified by the Sustainable Development Goals (SDGs) which aim to achieve a more sustainable future for all (Gupta et al, 2021; Zhan et al, 2021). Notably, CSR practices for social sustainability goals concentrate on improving the rights, welfare and entitlements of workers and enhancing quality of employment (Soundararajan and Brammer, 2018). Currently, in the banking sector, CSR practices have gained significant attention due to government and stakeholder requirements (Fatma and Rahman, 2016; Khan et al, 2019; Siueia et al, 2019). Despite the differences in processes, products and services, and the level of social, economic, and environmental impact, Banks share similar social responsibility with firms from other industries for two reasons: 1). the type of companies they lend to and invest in can affect the society and environment in very many ways. 2). their business processes such as purchasing can have adverse or beneficial effects on society and the environment (Castello, 2013). Therefore, in trying to be socially responsible, banks are seeking to sanitize their procurement activities to ensure that these activities do not put the society and environment at risk. Through their procurement activities, banks seek to influence suppliers' behavior with regards to transparency, working conditions, employee rights and the environment. Pal et al. (2011) posit that due to the importance of purchasing to the company, it has become imperative for purchasing departments to optimize the supplier selection process. Thus, banks like Bank Hapoalim in Israel have developed policies that will ensure that CSR is embedded and practiced in their procurement activities. In doing this, they communicate their CSR expectations and requirements to suppliers according to category of products and services, after which they evaluate and select them based on their CSR requirement which transcends price. However, to do this effectively, Bank Hapoalim went ahead to develop a procurement policy implementation model based on prevalent international methodologies, accumulated learning experience and benchmark review, subsequently adapting these findings to the current reality of the bank (Bank Hapoalim, 2015).

2.2. Socially responsible supplier selection

The selection of sustainable suppliers constitutes one of the most important supply chain decisions towards a company's sustainable performance (Giannakis et al, 2020; Kusi-Sapong et al, 2021; Orji and Wei, 2015). Clearly, the involvement of suppliers has become highly instrumental to the quest for achieving sustainability compliance along the supply chain (Wilhelm et al, 2016a). Indeed, sustainability increasingly depends on the holistic implementation of practices beyond the buying firm since non-adherence to sustainability standards across the supply chains bears a risk of negative publicity for global brands (Wilhelm et al, 2016b). In fact, responding to the growing social and environmental demands on business operations is a primary challenge for businesses since most firms have increasingly outsourced manufacturing to low-wage countries (Dubey et al, 2019). Often, this move has resulted in low environmental standards and inappropriate working

conditions (Hartmann and Moeller, 2014). There is ample anecdotal and conceptual literature suggesting that firms can experience serious losses from social, ecological or ethical problems that exist in their supply chains (Dubey et al, 2017; Hofmann et al, 2014). In fact, researchers have shown that both supplier social performance and buyer operational performance are increased in value when the buyer invests in socially responsible supplier development (Yawar and Kauppi, 2018). Yet, the role of socially responsible supplier development in addressing issues such as human or labor rights, poverty alleviation, gender issues and community development is still a new trend in the sustainable supply chain literature (Yawar and Seuring, 2018). Furthermore, within the developing countries, less attention is paid to social aspects despite the fact that such countries are characterized by abusive labor practices that continue to negatively affect trading partners (Mani et al, 2016; Quayson et al, 2021). Indeed, developing countries are characterized by greater informality, resulting in a lack of reliable measures in corporate governance, intellectual protection and accounting standards (Khan et al, 2021). Yet, relatively little research has been conducted on the extent to which companies in developing countries have integrated CSR practices in supplier selection for the social sustainability of their supply chains (Mani et al, 2018).

Past attempts exist of the consideration of CSR issues in the supplier selection problem. For instance, Govindan et al (2018) proposed a model to select the best supplier based on CSR practices in the presence of multiple stakeholders and to identify the stakeholder group whose perspective was vital. In a similar vein, Mani et al (2014) focused on selecting socially responsible suppliers through social parameters by using the AHP. However, a survey of existing literature shows that there is currently no published study that investigates the selection of sustainable suppliers based on considering CSR issues within the banking sector. A few published works relating to the banking sector considered CSR issues, but do not provide insights on the selection of suppliers (Goyal and Chanda, 2017; Khan et al, 2018; Siueia et al, 2019). Yet, only a few studies considered CSR issues in the banking sector in an emerging economy context such as Nigeria. For instance, Oyewumi et al (2018), by applying the panel data set from Nigerian banks, examined the influences of corporate social responsibility investment and disclosure. Based on Wallace and Hussain estimator of component variances, their findings indicate that CSR investment without due disclosure would have minimal or no contribution to corporate financial performance.

Therefore, to bridge the virtual and literature gap, this research is aimed at selecting sustainable suppliers with regards to CSR practices in the Nigerian banking sector. The choice of Nigeria is justified because its economic indices surpass those of other African countries in spite of prevailing institutional voids (Orji et al, 2022). Furthermore, Nigeria occupies a strategic position in the economic integration of African countries and study results are critical in developing a financial system which positively influences economic growth (Arize et al, 2018). Moreover, there is a global threat to the Nigerian financial industry's image necessitating government's responses that emphasize more transparency

and accountability (Babajide et al, 2020; Timipere et al, 2020). Consequently, there is mounting pressures on the Nigeria's bank managers who must now plan more strategically to gain the understanding and confidence of their key stakeholders (Pratt et al, 2011). In addition, Nigeria has the second largest financial industry in Africa, thereby making findings from this study useful for policy making decision in other African countries (Efobi et al, 2014). The critical highlights of this study are presented below:

(1) Various relevant CSR issues were sourced from a literature review and finalized based on the perspectives of experts in the Nigerian banking sector.
(2) A Shannon Entropy - TODIM approach-based framework was developed to analyze socially responsible suppliers in consideration of CSR issues.
(3) The proposed modeling framework was applied to the Nigerian banking sector and the results were further discussed, with inputs from experts in the case study, and compared with previous published works.

Within the context of globalization, the role of integrating CSR in selecting socially responsible suppliers is becoming increasingly relevant in maintaining competitiveness (Odetayo et al, 2014; Wilhelm et al, 2016). Typically, Nigeria is characterized by civil unrest and infrastructural deplorability (Adeleke, 2014). Therefore, Nigerian firms should implement CSR as part of strategic management goals, which would reward them with good public images and provide more business opportunities through creating a sustainable operational environment (Oyewumi et al, 2018). Moreover, business managers in developing countries like Nigeria are prone to pressure to ensure their firms' reputation are not destroyed by irresponsible behaviors on the part of suppliers who may be faced with limited capabilities and resources (Mani et al, 2016; Wilhelm et al, 2016a). Hence, a research methodology is required which can effectively address the evaluation of socially responsible suppliers in the Nigerian banking sector by considering the supplier performance with regards to CSR factors. Shannon Entropy is considered an effective tool to accurately determine the criteria weights through analysis of the subjective and objective opinions of experts (Saraswat and Digalwar, 2021). On the other hand, TODIM (an acronym in Portuguese of interactive and multi-criteria decision making) is a recently developed multiple criteria decision making (MCDM) method which can effectively capture the decision- makers' psychological behavior and is capable of handling information in the form of crisp numbers (Qin et al, 2017; Sang and Liu, 2017). The research methodology utilizes Shannon Entropy to compute the weights of the identified CSR factors and applies TODIM for the ranking of suppliers. Consequently, the proposed research methodology provides an effective approach for analyzing and ranking socially responsible suppliers in the Nigerian banking sector. Furthermore, it provides practical insights for management on the performances of alternative suppliers with regards to relevant CSR factors. The practical implications of the study are presented in order to equip corporate managers in banks with the fundamental knowledge on selecting socially

responsible suppliers to increase firm competitiveness in this era of globalization.

2.3. Identification of corporate social responsibility factors

The corporate social responsibility factors that are relevant to supplier selection in the banking sector have been collated from available published literature and finalized by experts in the Nigerian banking sector. The list of the finalized factors and respective brief definitions are shown in Table 1.

Table 1 Framework on the corporate social responsibility factors for supplier selection

Factor	Definition	References
Legal capability	Involves obeying laws, regulations, industrial standards issued by government or regulators through registration	Bourke et al, 2020; Chan et al, 2018; Hernandez et al, 2020; Lai et al, 2015; Jiang and Wong, 2016; Lan et al, 2019; Lin et al, 2017; Sardana et al, 2020
Civic responsibility	Encompasses human rights, social philanthropy and environmental protection	Davis- Sramek et al, 2020; He et al, 2019; Lin et al, 2017; Seele, 2017; Suganthi, 2019
Staff pension scheme	Funds are provided to cater for employees' retirement period	Chan et al, 2018; Josiah et al, 2014; Lan et al, 2019; Stepniewska et al, 2018
Number of recent jobs	Entails the number of executed jobs/contracts.	Hernandez et al, 2020; Lai et al, 2015; Lan et al, 2019; Park, 2019; Suganthi, 2019
Staff capability	Necessitates that employees have the required skills and expertise to implement social responsibility	Benitez et al, 2020; Lai et al, 2015; Jiang and Wong, 2016; Moktadir et al, 2018; Sardana et al, 2020
Quality procedures	Necessitates that the standards of goods and services are not below required specifications.	Adnan et al, 2018; Jiang and Wong, 2016; Kumar et al, 2020; Park, 2019
Health and safety procedures	Ensuring a safe work environment and not jeopardizing the health of workers	Benitez et al, 2020; Davis- Sramek et al, 2020; Govindan et al, 2014; Moktadir et al, 2018; Seele, 2017
Workmen's insurance	Providing packages to subsidize the cost of assessing necessary services	Kumar et al, 2020; Liu et al, 2019; Seele, 2017
Affiliation with OEM	Being aligned with original equipment manufacturers for ease of acquisition of equipment	Benitez et al, 2020; Govindan et al, 2014; Lau et al, 2018; Liu et al, 2019;
Financial capability	Budgetary allocations available for sustainability objectives	Benitez et al, 2020; He et al, 2019; Kumar et al, 2020; Lin et al, 2017

2.4. Application of Shannon-Entropy method

The current study applied the Shannon-Entropy method to aid in determining the weights of the CSR factors (criteria) involved in the decision making. Previous studies have reported the successful application of the TODIM method for effective decision making in various domains. Some of these studies have been listed in Table 2.

Table 2 Application of Shannon- Entropy in supply chain domain

Authors	Nature of contribution
Cesar, 2008	Supply chain information sharing
Raj and Lakshminarayanan, 2008	Optimization of decentralized supply chain networks
Shemshadi et al, 2011	Supplier performance evaluation and ranking
Ghorbani et al, 2012	Supplier selection and order allocation
Cheng et al, 2014	Structural complexity of supply chain networks

Mavi et al, 2016	Supplier selection in supply chain risk management
Khan et al, 2018	Sustainability performance evaluation of suppliers
Miranda dos Santos et al, 2019	Performance evaluation of green suppliers
Sellitto et al, 2019	Evaluating uncertainty in footwear supply chain
Zhang and David , 2019	Production logistics in supply chain

2.5. Application of TODIM method

This research applies the TODIM method to aid in analyzing and prioritizing suppliers based on their CSR performance in the Nigerian banking sector. Table 3 shows the application of the TODIM approach to different problems in supply chain management.

Table 3 Application of TODIM in supply chain domain

Authors	**Nature of contribution**
Tseng et al, 2014	Green supplier selection
Gomes et al, 2015	Supplier selection in the steel industry
Wang et al, 2016	Logistics outsourcing evaluation
Qin et al, 2017	Green supplier selection
Yu et al, 2017	Supplier selection in the telecommunication sector
Zhang et al, 2017	Selecting automobile suppliers
Zhong and Yao, 2017	Electronic material supplier selection
Li et al, 2018	Sustainability evaluation of photovoltaic module suppliers
Saraswat and Dilgawar, 2021	Evaluating energy alternatives
Tseng et al, 2019	Sustainable supply chain finance management

3 Methodology

The proposed study's methodology is depicted in Fig. 1. This research employs the case study method to examine supplier selection decision-making with regards to CSR issues in Nigeria's banking sector. Generally, there is no rule to ascertain the superiority of one method over another since methods are applied within the specified case conditions (Orji et al, 2022a). Thus, the Shannon Entropy method was integrated with TODIM method in the analysis of the supplier selection problem in this study. Notably, we defined a decision table by $T=(U,C,V)$, where $U=\{s_1,s_2,\cdots,s_n\}$ is a set of n alternatives called the universe and $C=\{c_1,c_2,\cdots,c_m\}$ is a set of m attributes. Let v_{ij} be the performance value for an alternative s_i with respect to an attribute c_j.

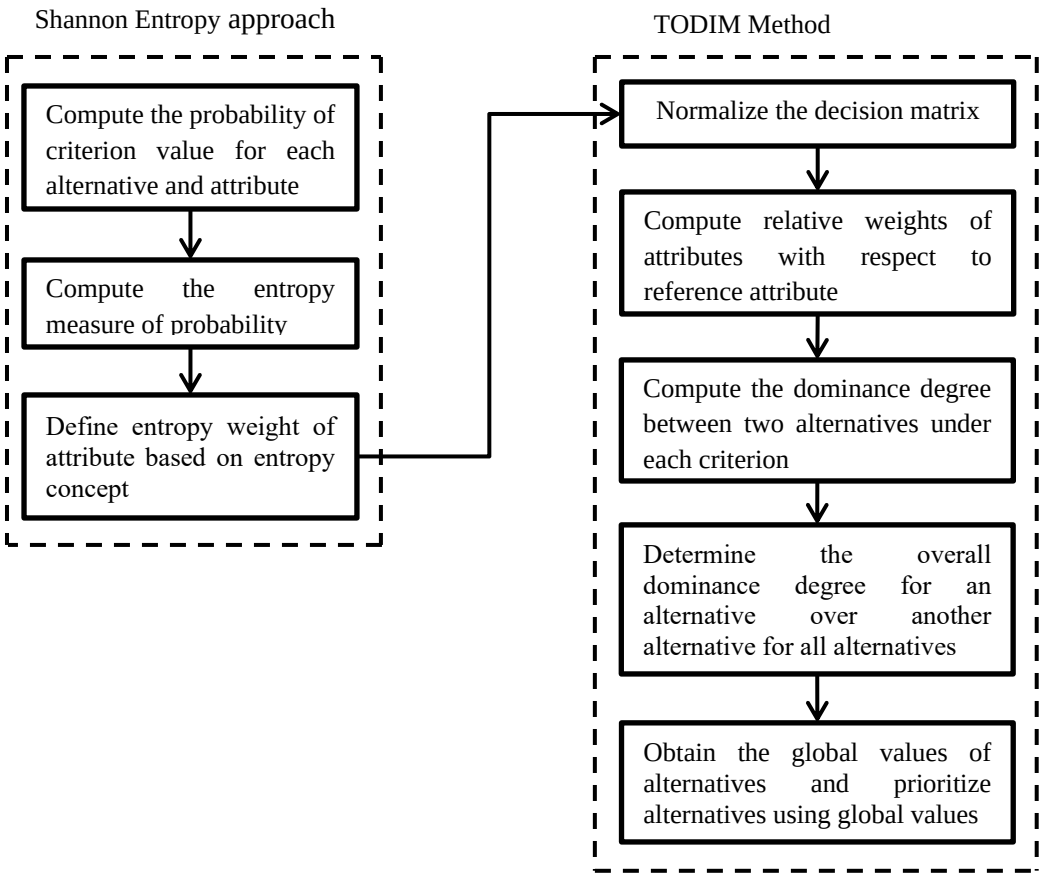

Fig.1 Proposed research methodology

3.1. Shannon Entropy

Entropy concept, first developed by Shannon and Weaver in 1947, has be widely employed in the process of decision making (Lee and Chang, 2018; Saraswat and Digalwar, 2021). Entropy may be denoted by the elimination of uncertainty, while the uncertainty is described by a discrete probability distribution. When the difference of the criterion value among the evaluating objects is higher and the entropy of the criterion is smaller, the criterion provides more useful information. Hence, the weight of this criterion should be set higher. On the other hand, if the difference is smaller and the entropy is higher, the relative weight of this criterion would be smaller. Shannon entropy adopts the following procedure to determine criteria weights (Hwang and Yoon 1981):

Step 1: Computing the probability p_{ij} of criterion value of the attribute c_j and the alternative s_i :

$$p_{ij} = \frac{v_{ij}}{\sum_{i=1}^{n} v_{ij}} \tag{1}$$

Step 2: Computing the entropy measure of probability using the following equation:

$$E_j = -k\sum_{i=1}^{n} p_{ij} \ln p_{ij} \tag{2}$$

Where, $k = \frac{1}{\ln n}$, and suppose when p_{ij} =0, $p_{ij} \ln p_{ij}$ =0.

Step 3: Defining the entropy weight of attribute c_j based on the entropy concept:

$$w_j = \frac{1 - E_j}{\sum_{j=1}^{m}(1 - E_j)} \tag{3}$$

Where, $0 \le w_j \le 1$, $\sum_{j=1}^{m} w_j = 1$.

3.2. The TODIM method

TODIM (Gomes and Lima 1992) is useful for solving multi- criteria decision making (MCDM) problems based on the prospect theory. TODIM has been applied in the field of green supply chain management (Bai et al. 2019). TODIM has the following steps:

Step 1: Normalizing the decision matrix by the following equation:

$$\tilde{v}_{ij} = \frac{v_{ij}}{\max_{i,j}(v_{ij})} \tag{4}$$

Step 2: Calculating the relative weight w_{jr} of attribute c_r to the reference attribute c_j using an Eqn (5):

$$w_{jr} = \frac{w_j}{w_r} \qquad j, r \in 1, \ldots, m \tag{5}$$

Where, w_j is the weight of the attribute c_j, $w_r = \max\{w_j \mid j \in 1, \ldots, n\}$.

Step 3: Calculating the dominance degree of alternative s_i over each alternative s_k for attribute c_j using an Eqn (6):

$$\phi_j(s_i, s_k) = \begin{cases} \sqrt{\dfrac{w_{jr}}{\sum_{j=1}^{m} w_{jr}}(\tilde{v}_{ij} - \tilde{v}_{kj})} & \text{if } \tilde{v}_{ij} - \tilde{v}_{kj} \ge 0 \\ \dfrac{-1}{\theta}\sqrt{\dfrac{\sum_{j=1}^{m} w_{jr}}{w_{jr}}(\tilde{v}_{kj} - \tilde{v}_{ij})} & \text{otherwise} \end{cases} \tag{6}$$

Where θ is the attenuation factor of the losses. $\tilde{v}_{ij} - \tilde{v}_{kj}$ denotes the gain of alternative s_i over alternative s_k for attribute c_j if $\tilde{v}_{ij} - \tilde{v}_{kj} > 0$ and the loss of alternative s_i over alternative s_k for attribute c_j if $\tilde{v}_{ij} - \tilde{v}_{kj} < 0$. **Step 4:**

Calculating the overall dominance degree of alternative s_i over alternative s_k, for all attributes and alternatives using Eqn (7):

$$\delta(s_i, s_k) = \sum_{j=1}^{m} \phi_j(s_i, s_k), \quad \forall(i, j) \tag{7}$$

Step 5: Obtaining the global value ε_i of alternative s_i using Eqn (8):

$$\varepsilon_i = \frac{\sum_{k=1}^{n} \delta(s_i, s_k) - \min_i \sum_{k=1}^{n} \delta(s_i, s_k)}{\max_i \sum_{k=1}^{n} \delta(s_i, s_k) - \min_i \sum_{k=1}^{n} \delta(s_i, s_k)} \qquad i \in 1, \ldots, n. \tag{8}$$

Step 6: Sorting the alternatives by their value ε_i.

4. Case Study

4.1. Description of case problem

In Nigeria, the banking sector has been making continuous efforts to implement socially responsible sourcing to improve profitability and ultimately actualize the Sustainable Development Goals (SDGs) (Odetayo et al, 2014). Indeed, banks play a critical role in sustainable development since they provide financial services for economic prosperity and can aid in actualizing any nation's environmental, economic and social sustainability (Nwagwu, 2020). The decision support modeling framework proposed in this paper was employed in the bank, henceforth referred to as 'Company A' within the Nigerian banking sector. Company A was established in 1982 for business activities including commercial and retail banking, investment banking, brokerage, wealth management and trustee services. Company A operated six segments namely investment banking, business banking, corporate banking, personal banking, institutional banking and treasury and financial markets. In 2011, the bank's total assets were valued at US$3.65billion, with shareholders' equity of approximately US$772.2 million for which reason it was considered crucial to the Nigerian banking sector. Company A planned to invest in CSR activities so as to enhance its public image, and achieve competitive marketing edge mostly among consumers that are increasingly socially conscious, which would result in increasing the long- term revenue (Oyewumi et al, 2018). The case company classified goods and services as categories. For instance, structured cabling installation was regarded as a category on its own. The same categorization applied to network equipment security accessories, computer accessories, and enterprise user support services. The case company procured the different categories of items from different suppliers. Hence, selecting socially responsible suppliers would enable the company to burnish its reputation, build

corporate competitive advantage and ensure social sustainability performance. The case company was selected based on the commitment of the management team due to the pressure to balance customer demands with the requirements of government regulatory bodies in order to achieve sustainable goals. Questionnaires were designed and distributed to experts (managers) who were deemed knowledgeable due to their high level of experience in social responsibility issues. The questionnaires consisted of two sections, but the first section collected demographical information of the experts (managers) and the definitions of CSR factors (for details see Table 1), while the second section was made up of questions to obtain the supplier performance with respect to the finalized CSR criteria. We purposively identified 15 experts (managers) and invited them to participate in the survey (self-selection) (Bai et al., 2019a) for subsequent socially responsible supplier selection, and 12 managers gave their consent to participate after being assured of the confidentiality of their responses. A twelve member decision-making team included the finance manager, procurement manager, category managers, research and development manager, and general manager. Several measures were employed during the survey to increase the questionnaire response rate and minimize the bias of response amongst the banking experts. Initially, a pilot- test was conducted to obtain and review responses by distributing the designed questionnaires to three academic researchers through email communications and carrying out in-person interviews with three purchasing managers in Nigeria. The questionnaires were further modified using the academic researchers and purchasing managers' feedbacks from the pilot- test and sent to the 12 managers who consented to participate in the study. Then, a follow- up on the questionnaires was done through phone conversations and personal visits after which 10 out of the 12 distributed questionnaires were completed and returned, indicating a 83.3% rate of response. The relatively small sample size of completed questionnaires is considered adequate to provide sufficient findings on the socially responsible supplier selection because Shannon-Entropy-based TODIM is capable of proffering accurate results with a small sample size (Khan et al, 2018; Li et al, 2018; Saraswat and Dilgawar, 2021; Tseng et al, 2014). Table 4 shows the summary of demographical information of the managers who were specifically formed to partake in the process of decision-making from the company considered in this study.

Table 4 Demographical information of respondents

Characteristics	Sample size	Percentage of sample size (%)
Age		
30- 39	2	20
40- 55	8	80
Gender		
Male	6	60
Female	4	40
Education		
Bachelor's degree	3	30
Postgraduate degree	7	70
Years of experience:		
10- 20	4	40

More than 20	6	60
Role		
Research and development manager	1	10
Procurement manager	1	10
Category manager	5	50
Finance manager	2	20
Investment Analyst/ manager	1	10

The respondents (experts) shortlisted 30 suppliers from the bank's supply- base to participate in the socially responsible supplier selection. The features of these suppliers are shown in Table 5. A t- test (Orji et al, 2020) was employed to investigate the non-response bias and the possibility of generalizing the survey results to the sample size by determining the significant change in value between the number of employees and annual turnover for the suppliers between the initial and final half of the time frame. The results of the t- test indicate no significant variations ($p < 0.05$) between the two categories of data, hence showing that the feedbacks were considered largely unbiased.

Table 5 Characteristics of suppliers

Supplier	Location	Number of employees	Annual turnover ($)
Supplier 1	Lagos	305	5,700,000
Supplier 2	Lagos	243	5,100,000
Supplier 3	Lagos	279	5,200,000
Supplier 4	Lagos	322	7,000,000
Supplier 5	Lagos	511	18,000,000
Supplier 6	Lagos	234	5,100,000
Supplier 7	Lagos	567	20,100,000
Supplier 8	Lagos	211	5,100,000
Supplier 9	Lagos	190	4,500,000
Supplier 10	Lagos	412	7,800,000
Supplier 11	Lagos	330	9,200,000
Supplier 12	Lagos	200	5,000,000
Supplier 13	Lagos	150	4,000,000
Supplier 14	Lagos	344	6,800,000
Supplier 15	Lagos	211	5,000,000
Supplier 16	Lagos	200	4,500,000
Supplier 17	Lagos	304	6,850,000
Supplier 18	Lagos	322	5,600,000
Supplier 19	Lagos	290	4,300,000
Supplier 20	Lagos	231	4,150,000
Supplier 21	Lagos	277	4,000,000
Supplier 22	Lagos	245	4,180,000
Supplier 23	Lagos	435	11,100,000
Supplier 24	Lagos	511	23,000,000
Supplier 25	Lagos	344	5,100,000
Supplier 26	Lagos	234	4,005,000
Supplier 27	Lagos	278	5,000,000
Supplier 28	Lagos	289	4,700,000
Supplier 29	Lagos	314	4,900,000
Supplier 30	Lagos	450	12,000,000

4.2. Applying Shannon-Entropy Based TODIM to socially responsible supplier selection decision

The integrated Shannon-Entropy and TODIM methodology was now applied to Company A in this study. The socially responsible supplier evaluation and selection framework involved in this decision making comprised eight steps. The modeling framework determined the categorization of the suppliers using their social responsibility performance

Step 1: Develop the decision system.

The decision support system for supplier social responsibility evaluation and selection was initially defined. The system was defined by $T = (S, C)$, where $S = \{s_1, s_2, ..., s_m\}$ is a set of m socially responsible suppliers, and $Q = \{q_1, q_2, ..., q_m\}$ is a set of n corporate social responsibility attributes. For this empirical case, let $S = \{s_j, j = 1, 2, ..., 30\}$ and $C = \{c_i, i = 1,2,...10\}$.

This study utilized the ten corporate social responsibility factors displayed in Table 1.

Step 2: Estimate the values of all attributes.

Within this step, the thirty (30) suppliers involved were rated via group decision-making against the ten (10) corporate social responsibility attributes. The linguistic scale with scores from 0- 5 was used by the managers to rate 'Legal Capability', 'Civic Responsibility', 'Staff pension scheme', 'Health and Safety Procedures' and 'Workman Insurance' as shown in Table 6.

Table 6 Linguistic scale for rating legal capability, civic responsibility, workman insurance, staff pension scheme and health and safety procedures

Linguistic term	Score
Very high	5
High	4
Moderate	3
Low	2
Very low	1
Zero	0

Regarding quality procedures, it was based on the verifiable possession of a current ISO certificate by the supplier for which full marks were scored. However, in the absence of ISO certification, a quality manual detailing the QA procedures from vision, mission organization structure, etc. would, if available, be evaluated and scores would be awarded based on the contents of the said manual. For the evaluation of the financial capability of the supplier, working capital (WC) requirement was grouped in bands (e.g. N1mn to N10mn forms one band), and a score was assigned to each band. The higher the WC the greater the score. In this context, the idea was that the working capital requirement for a supplier of newspapers is not the same as for a supplier of soundproof electrical generating sets. The financial capability was assessed based on the expected value of the business of the supplier. For Number of Recent (within the last three years) jobs – the scoring started with a zero when no job has been executed within the stipulated time interval. For jobs undertaken on behalf of non-bank organizations, the score was 10 for three or more jobs and this was pro-rated for less than three jobs. Similarly, in the case of jobs performed for

banking institutions, the full score was allocated for three or more jobs and pro-rated for less than three jobs. Regarding Affiliation with OEM scores – one OEM affiliation attracts the maximum score of 10. Three companies got a score of 5 each instead of 10 because they were yet to renew the OEM certifications.

This exercise of rating the CSR factors by the team of experts resulted in the outcome displayed in Table 7.

Table 7 Initial decision table of suppliers' ratings against corporate social responsibility attributes via group decision-making

Suppliers (S)	Legal capability	Civic responsibility	Staff pension scheme	Number of jobs	Staff capability	Quality procedures	Health and safety procedures	Workman insurance	Affiliation with OEM	Financial capability
S1	5	5	5	20	12	10	5	5	10	20
S2	5	5	5	20	12	10	5	5	10	20
S3	5	5	2	20	15	7	5	5	10	20
S4	5	5	5	20	12	3	5	5	10	20
S5	5	5	5	18	12	10	5	0	10	20
S6	5	5	5	20	12	6	5	0	10	20
S7	5	5	5	20	12	0	5	5	10	20
S8	5	5	5	13	12	10	5	0	10	20
S9	5	5	5	20	15	0	5	0	10	20
S10	5	0	5	15	12	10	5	0	10	20
S11	5	5	5	20	12	0	5	0	10	20
S12	5	5	5	20	12	0	0	5	10	20
S13	5	3	5	5	14	10	5	5	10	20
S14	5	5	5	20	15	10	0	5	0	16
S15	5	5	5	20	15	0	5	5	0	20
S16	5	5	5	4	15	10	5	5	5	20
S17	5	5	5	11	12	0	5	5	10	20
S18	5	5	5	16	12	0	0	5	10	20
S19	5	5	5	10	12	8	5	5	0	20
S20	5	5	0	10	15	10	0	0	10	20
S21	5	5	5	15	12	0	0	0	10	20
S22	5	5	5	20	12	3	2	0	0	20
S23	5	5	0	20	12	0	0	0	10	20
S24	5	4	5	20	13	0	5	0	5	5
S25	5	2	0	0	10	0	3	5	10	20
S26	5	5	0	15	15	0	4	0	5	5
S27	5	5	5	0	12	0	0	5	0	20
S28	5	5	0	15	12	10	5	0	0	0
S29	5	5	5	4	10	0	2	0	10	0
S30	5	5	5	4	10	0	2	0	10	0

Step 3: Determine the weight of each attribute by Shannon Entropy.

This step was divided into two sub-steps.

Sub-step 1. Compute the probability p_{ij} of criterion value of the attribute c_j and the alternative s_i by the Eqn (1). In our case, v_{12}=5 was the value of the attribute c_2 and the alternative s_1. The sum value of the attribute c_2 was $\sum_{i=1}^{n} v_{i2}$ = 136. Hence, $p_{i2} = \frac{v_{i2}}{\sum_{i=1}^{n} v_{i2}} =$ 0.037.

Sub-step 2. Compute the entropy measure of probability by the Eqn (2). In our case, $k = \frac{1}{\ln n} = \frac{1}{\ln 30} = 0.294$. Then, the entropy measure of probability E_2 for the attribute c_2 was $E_2 = -k\sum_{i=1}^{n} p_{i2} \ln p_{i2}$ =-0.294*(0.037*ln0.037+$\sum_{i=2}^{n} p_{i2} \ln p_{i2}$)=0.984.

Sub-step 3. Compute the entropy weight of attribute c_j by the Eqn (3). In our case, the entropy weight of attribute c_2 was $w_2 = \frac{1-E_2}{\sum_{j=1}^{m}(1-E_2)}$ = 0.0203. The entropy weights of all attributes are shown in Table 8.

Table 8 The weight of attributes (CSR factors)

Attributes	Weight	Relative weight
Legal Capability	0	0.000
Civic Responsibility	0.02	0.071
Staff Pension Scheme	0.089	0.313
Number Of Recent Jobs	0.052	0.183
Staff Capability	0.003	0.010
Quality Procedures	0.284	1.000
Health And Safety Procedures	0.128	0.450
Workman Insurance	0.264	0.931
Affiliation With OEM	0.109	0.382
Financial Capability	0.052	0.183

Step 4: Calculate the relative weight w_{jr} of attribute c_r

The relative weight w_{jr} of attribute *j was* identified by Eqn (5). The calculated relative weights of all attributes are also shown in Table 8.

Step 5: Normalize the decision matrix

In our case, the normalization process results in a matrix with all increasing values (see Table 9).

Table 9 The normalized performance values of attributes

Suppliers (S)	Legal capability	Civic responsibility	Staff pension scheme	Number of jobs	Staff capability	Quality procedures	Health and safety procedures	Workman insurance	Affiliation with OEM	Financial capability
S1	1	1	1	1	0.8	1	1	1	1	1
S2	1	1	0.4	1	1	0.7	1	1	1	1
S3	1	1	1	1	0.8	0.3	1	1	1	1
S4	1	1	1	0.9	0.8	1	1	0	1	1
S5	1	1	1	1	0.8	0.6	1	0	1	1
S6	1	1	1	1	0.8	0	1	1	1	1
S7	1	1	1	0.65	0.8	1	1	0	1	1
S8	1	1	1	1	1	0	1	0	1	1
S9	1	0	1	0.75	0.8	1	1	0	1	1
S10	1	1	1	1	0.8	0	1	0	1	1
S11	1	1	1	1	0.8	0	0	1	1	1
S12	1	0.6	1	0.25	0.93	1	1	1	1	1
S13	1	1	1	1	1	1	0	1	0	0.8
S14	1	1	1	1	1	0	1	1	0	1

S15	1	1	1	0.2	1	1	1	1	0.5	1
S16	1	1	1	0.55	0.8	0	1	1	1	1
S17	1	1	1	0.8	0.8	0	0	1	1	1
S18	1	1	1	0.5	0.8	0.8	1	1	0	1
S19	1	1	0	0.5	1	1	0	0	1	1
S20	1	1	1	0.75	0.8	0	0	0	1	1
S21	1	1	1	1	0.8	0.3	0.4	0	0	1
S22	1	1	0	1	0.8	0	0	0	1	1
S23	1	0.8	1	1	0.87	0	1	0	0.5	0.25
S24	1	0.4	0	0	0.67	0	0.6	1	1	1
S25	1	1	0	0.75	1	0	0.8	0	0.5	0.25
S26	1	1	1	0	0.8	0	0	1	0	1
S27	1	1	0	0.75	0.8	1	1	0	0	0
S28	1	1	1	0.2	0.67	0	0.4	0	1	0
S29	1	0.4	0	0.5	0.67	0	0	0	0	0
S30	1	0.4	0	0	0.8	0	0.4	1	1	1

Step 6: Determine the dominance measures of each object for each attribute.

This step was to determine the values $\phi_j(s_i, s_k)$ of the dominance measures given in Eqn (6). The attenuation factor θ of the losses is set to θ=12 for which the range of values was $0 < \theta < \frac{\sum_{j=1}^{n} w_{jr}}{w_{jr}}$.

In our case, $\tilde{v}_{1,2}$ = 1 was the value of attribute c_2 for alternative s_1 and $\tilde{v}_{1,2} - \tilde{v}_{12,2}$ =0.4, since 0.6 was the value of attribute c_2 for alternative s_{12}.

Then, $\phi_2(s_1, s_{12}) = \sqrt{\frac{w_{2r}}{\sum_{j=1}^{m} w_{2r}} (\tilde{v}_{1,2} - \tilde{v}_{12,2})}$ = 0.090.

Step 7: Acquire the overall dominance measures of each object.

This step was to determine the value $\delta(s_i, s_k)$ of the overall dominance measures for all objects between s_i and s_k $k \in n$.

In the current study, the overall dominance measures for all objects between s_1 and s_{13} was $\delta(s_1, s_{13}) = \sum_{j=1}^{m} \phi_j(s_1, s_{13}) = 0 + 0.090 + \sum_{j=3}^{m} \phi_j(s_1, s_{13})$ =0.771. The overall dominance measures of all objects are given in Table 10.

Table 10 The overall dominance measures of all attributes

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30
S1	0.000	0.000	-0.190	0.446	0.586	0.851	0.533	0.649	0.335	0.770	1.047	0.890	-0.294	0.077	0.150	-0.275	0.686	0.992	0.729	0.619	1.518	1.566	1.702	1.129	1.414	1.337	1.448	1.483	1.775	2.550
S2	0.000	0.000	-0.190	0.446	0.586	0.851	0.533	0.649	0.335	0.770	1.047	0.890	-0.294	0.077	0.150	-0.275	0.686	0.992	0.729	0.619	1.518	1.566	1.702	1.129	1.414	1.337	1.448	1.483	1.775	2.550
S3	-0.279	-0.279	0.000	0.144	0.307	0.489	0.252	0.370	0.743	0.492	0.766	0.610	-0.001	0.486	0.559	0.135	0.406	0.712	0.248	1.136	1.238	1.264	1.529	1.256	1.229	1.852	1.168	1.311	1.482	2.365
S4	-0.131	-0.131	-0.580	0.000	0.455	0.428	0.292	0.518	0.094	0.640	0.806	0.649	-0.425	-0.054	-0.091	-0.406	0.445	0.751	0.380	0.488	1.277	1.120	1.461	0.888	1.173	1.096	1.207	1.352	1.534	2.309
S5	-0.278	-0.278	-0.467	0.168	0.000	0.222	0.255	0.114	-0.295	0.231	0.417	0.613	-0.470	-0.201	-0.127	-0.450	0.506	0.800	0.550	0.088	0.979	0.937	1.073	0.500	1.241	0.797	1.274	0.943	1.247	2.019
S6	-0.261	-0.261	-0.693	0.130	-0.027	0.000	0.251	0.036	-0.299	0.158	0.413	0.608	-0.555	-0.184	-0.132	-0.536	0.404	0.710	0.259	0.006	0.884	0.898	1.068	0.495	1.132	0.703	1.166	0.870	1.140	1.916
S7	-0.156	-0.156	-0.612	-0.086	0.430	0.393	0.000	0.493	-0.198	0.614	0.514	0.357	-0.450	-0.080	-0.383	-0.431	0.153	0.460	0.351	0.462	0.986	1.035	1.169	0.597	0.882	0.804	0.915	1.327	1.242	2.017
S8	-0.378	-0.378	-0.568	0.068	-0.183	0.121	0.155	0.000	-0.395	0.027	0.317	0.512	-0.509	-0.302	-0.228	-0.488	0.443	0.587	0.494	0.032	0.775	0.836	0.972	0.399	1.208	0.593	1.242	0.739	1.210	1.963
S9	-0.295	-0.295	-0.062	-0.224	-0.061	-0.098	-0.139	0.002	0.000	0.124	0.023	0.219	-0.017	0.470	0.167	0.119	0.014	0.321	0.212	0.660	0.495	0.544	0.679	0.513	0.731	1.002	0.776	0.836	0.739	1.514
S10	-0.930	-0.930	-1.119	-0.484	-0.727	-0.431	-0.397	-0.513	-0.947	0.000	-0.235	-0.040	-1.036	-0.853	-0.780	-1.057	-0.112	0.061	-0.066	-0.528	0.305	0.284	0.420	-0.154	0.741	0.123	0.670	0.270	0.640	1.508
S11	-0.319	-0.319	-0.774	-0.248	-0.084	-0.121	-0.162	-0.021	-0.712	0.100	0.000	0.195	-0.612	-0.242	-0.545	-0.594	-0.009	0.297	0.189	-0.052	0.472	0.521	0.655	0.083	0.719	0.290	0.753	0.813	0.728	1.503
S12	-0.390	-0.390	-0.845	-0.319	0.197	0.160	-0.233	0.259	-0.431	0.381	0.281	0.000	-0.683	-0.437	-0.616	-0.665	-0.080	0.102	0.118	0.105	0.628	0.610	0.812	0.363	0.475	0.435	0.558	1.093	0.817	1.660
S13	-0.667	-0.667	-0.575	-0.221	-0.131	0.184	-0.134	-0.068	-0.051	0.385	0.380	0.223	0.000	-0.309	-0.235	-0.497	-0.018	0.268	0.034	0.205	0.795	0.899	1.035	0.912	1.262	0.895	0.983	0.760	1.259	2.167
S14	-0.626	-0.626	-0.127	-0.181	-0.040	0.225	-0.094	0.023	0.397	0.144	0.420	0.140	-0.349	0.000	0.136	-0.372	0.059	0.242	0.026	0.557	0.768	0.672	0.951	0.886	0.602	1.240	0.621	0.920	1.084	1.850
S15	-0.386	-0.386	-0.153	-0.315	0.200	0.163	-0.230	0.263	0.261	0.385	0.284	0.128	-0.108	0.303	0.000	-0.131	-0.076	0.230	0.045	0.921	0.756	0.729	0.940	0.615	0.640	1.104	0.609	1.021	1.000	1.699
S16	-0.482	-0.482	0.017	-0.036	0.053	0.369	0.051	0.114	0.541	0.230	0.565	0.408	-0.157	0.366	0.439	0.000	0.161	0.452	0.295	0.790	0.978	1.166	1.220	1.000	1.120	1.431	1.249	1.025	1.403	2.103
S17	-0.401	-0.401	-0.857	-0.331	0.142	0.148	-0.245	0.242	-0.443	0.337	0.269	0.112	-0.523	-0.325	-0.628	-0.501	0.000	0.175	0.241	0.352	0.708	0.790	0.924	0.352	0.823	0.526	0.856	1.049	1.173	1.907
S18	-0.553	-0.553	-1.009	-0.482	0.009	-0.004	-0.396	0.213	-0.595	0.318	0.118	-0.163	-0.712	-0.601	-0.779	-0.692	-0.119	0.000	0.081	0.068	0.565	0.447	0.649	0.200	0.451	0.372	0.534	1.030	0.790	1.623
S19	-0.581	-0.581	-0.824	-0.134	-0.040	0.241	-0.035	0.050	-0.233	0.151	0.479	0.323	-0.700	-0.581	-0.494	-0.836	0.142	0.381	0.000	0.134	0.912	0.909	1.135	0.403	1.038	0.572	0.995	0.787	1.386	2.003
S20	-0.910	-0.910	-0.539	-0.464	-0.720	-0.411	-0.377	-0.631	-0.238	-0.530	-0.215	-0.144	-0.457	-0.269	-0.071	-0.317	-0.200	-0.086	-0.084	0.000	0.094	0.113	0.298	0.275	0.492	0.572	0.605	0.165	0.488	1.230
S21	-0.734	-0.734	-1.190	-0.664	-0.531	-0.537	-0.578	-0.317	-1.128	-0.247	-0.416	-0.345	-0.882	-0.782	-0.961	-0.862	-0.293	-0.244	-0.092	-0.457	0.000	-0.086	0.115	-0.333	0.282	-0.193	0.365	0.465	0.269	1.098
S22	-0.727	-0.727	-1.176	-0.596	-0.492	-0.519	-0.304	-0.429	-0.854	-0.308	-0.142	0.103	-1.020	-0.677	-0.763	-1.160	-0.151	0.205	-0.292	-0.411	0.379	0.000	0.563	-0.218	0.428	-0.137	0.584	0.328	0.490	1.334
S23	-0.831	-0.831	-1.415	-0.761	-0.597	-0.634	-0.675	-0.534	-1.225	-0.413	-0.513	-0.442	-1.125	-0.879	-1.058	-1.106	-0.522	-0.340	-0.324	-0.707	-0.166	-0.183	0.000	-0.430	0.015	-0.376	0.116	0.282	0.024	0.848
S24	-1.063	-1.063	-1.401	-0.992	-0.828	-0.865	-0.906	-0.766	-1.339	-0.397	-0.744	-0.549	-0.964	-0.843	-1.089	-1.275	-0.753	-0.447	-0.473	-0.679	-0.273	-0.141	-0.089	0.000	0.208	-0.271	0.091	0.354	0.178	1.277
S25	-1.984	-1.984	-2.193	-1.913	-1.451	-1.434	-1.827	-1.399	-1.651	-0.877	-1.313	-1.403	-1.850	-1.466	-1.836	-1.887	-1.733	-1.364	-1.531	-0.996	-0.840	-0.762	-0.609	-0.931	0.000	-0.849	-0.708	-0.584	0.005	1.090
S26	-1.358	-1.358	-1.253	-1.287	-1.154	-1.160	-1.201	-0.941	-1.063	-0.871	-1.039	-0.777	-0.934	-0.500	-0.813	-0.850	-0.917	-0.676	-0.633	-0.219	-0.433	-0.383	-0.335	-0.484	-0.160	0.000	0.015	0.110	0.081	0.921
S27	-1.008	-1.008	-1.463	-0.937	-0.475	-0.458	-0.851	-0.423	-1.049	-0.302	-0.337	-0.618	-1.316	-1.132	-1.310	-1.444	-0.757	-0.580	-0.631	-0.568	-0.055	-0.084	0.194	-0.413	-0.006	-0.407	0.000	0.334	0.197	0.911
S28	-1.244	-1.244	-1.561	-0.798	-1.040	-0.744	-0.711	-0.827	-1.261	-0.756	-0.549	-0.353	-1.391	-1.307	-1.170	-1.530	-0.426	-0.252	-0.456	-0.860	-0.009	-0.106	0.089	-0.639	0.305	-0.381	0.280	0.000	0.465	1.134
S29	-1.773	-1.773	-1.855	-1.703	-1.590	-1.576	-1.617	-1.529	-1.793	-1.413	-1.455	-1.210	-1.679	-1.336	-1.625	-1.552	-1.506	-1.166	-1.301	-1.118	-0.992	-1.030	-0.750	-1.106	-0.122	-0.990	-0.452	-0.562	0.000	0.764
S30	-2.743	-2.743	-2.953	-2.673	-2.554	-2.546	-2.587	-2.465	-2.763	-1.962	-2.425	-2.354	-2.420	-2.557	-2.672	-2.624	-2.411	-2.296	-2.216	-2.148	-2.116	-2.172	-1.912	-2.215	-0.800	-2.126	-1.681	-1.607	-1.008	0.000

Step 8: Determine the global value for each object.

This step was divided into two sub-steps:

Sub-step1: Determine the value of the sum overall dominance measures for each category attributes between s_i and s_k $k \in n$. In our case, the value of the sum of overall dominance measures for each category attributes between s_1 and s_k $k \in n$ was

$\sum_{k=1}^{m} \delta(s_1, s_k) = 0 + 0 + \cdots\cdots + 2.550 = 24.524.$

Sub-step2: Determine the max value and min value of the sum overall dominance measures. In our case, the min value was $\min_i \sum_{k=1}^{m} \delta(S_i, S_k) = -65.749$ for s_{30}, and the max value was $\min_i \sum_{k=1}^{m} \delta(S_i, S_k) = 24.524$ for s_1.

Sub-step3: Determine the global value ε_i of the s_i through normalization of the corresponding overall dominance measurements using expression (8). In our case, the global value ε_1 of the s_1 was $\varepsilon_1 = \frac{\sum_{k=1}^{m} \delta(s_1, s_k) - \min_i \sum_{k=1}^{m} \delta(s_i, s_k)}{\max_i \sum_{k=1}^{m} \delta(s_i, s_k) - \min_i \sum_{k=1}^{m} \delta(s_i, s_k)} = \frac{24.524 - (-65.749)}{24.524 - (-65.749)} =$

1. The global values of all attributes for the objects with their respective scores and ranks are given in Table 11.

Table 11 The global value of all attributes (CSR factors) for objects (Suppliers)

Suppliers	ε_i	**Score**	**Rank**
Supplier 1	1.000	0.930676	1
Supplier 2	1.000	0.930676	2
Supplier 3	0.972	0.902665	3
Supplier 4	0.923	0.849067	4
Supplier 5	0.866	0.829445	10
Supplier 6	0.842	0.794606	12
Supplier 7	0.868	0.837409	6
Supplier 8	0.831	0.789239	13
Supplier 9	0.828	0.832841	9
Supplier 10	0.658	0.758098	16
Supplier 11	0.756	0.763517	14
Supplier 12	0.772	0.754322	17
Supplier 13	0.829	0.835926	7
Supplier 14	0.834	0.822519	11
Supplier 15	0.845	0.834154	8
Supplier 16	0.910	0.844619	5
Supplier 17	0.800	0.759706	15

Supplier 18	0.737	0.707453	19
Supplier 19	0.806	0.736107	18
Supplier 20	0.692	0.706158	20
Supplier 21	0.617	0.62575	23
Supplier 22	0.654	0.634617	22
Supplier 23	0.564	0.625586	24
Supplier 24	0.550	0.657248	21
Supplier 25	0.326	0.566403	28
Supplier 26	0.510	0.587462	26
Supplier 27	0.551	0.572384	27
Supplier 28	0.536	0.62378	25
Supplier 29	0.332	0.528281	29
Supplier 30	0.000	0.368674	30

As shown in Table 11, the most socially responsible suppliers in the considered bank were suppliers 1 and 2 since they had the highest score of 0.930676 with regard to the corporate social responsibility factors compared to the rest of the suppliers.

4.3. Sensitivity analysis

Here, we altered the value of the basic TODIM attenuation parameter θ to determine the impact of the changes on the global value and to investigate the robustness of the results. The range of attenuation factor θ values is set to $0<\theta<19$ and the results are shown in Table 12. Apart from the top two and the bottom two, the rankings of all other companies have almost changed. Therefore, this parameter plays a decisive role in the ranking of companies. Some scholars have proved that the best parameter is between 10 and 14 (Bai et al., 2019b). In our results, the ranking of the θ parameter between 10 and 16 is relatively stable, and the ranking change will not be greater than 2 compared with base findings of θ=12. So, we select θ=12 as the basic model parameter.

Table 12 The global value of companies for different θ values

θ	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
S1	1.000	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**
S2	1.000	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**
S3	0.998	0.995	0.992	0.989	0.987	0.984	0.982	0.980	0.978	0.976	0.975	0.973	0.971	0.970	0.968	0.967	0.966	0.965	0.963
S4	0.969	0.964	0.959	0.954	0.950	0.946	0.942	0.938	0.935	0.931	0.928	0.926	0.923	0.920	0.918	0.916	0.913	0.911	0.909
S5	0.929	0.922	0.915	0.909	0.903	0.897	0.892	0.887	0.883	0.879	0.875	0.871	0.867	0.864	0.860	0.857	0.854	0.852	0.849
S6	0.933	0.923	0.913	0.904	0.895	0.887	0.880	0.873	0.866	0.860	0.854	0.848	0.843	0.838	0.833	0.829	0.824	0.820	0.816
S7	0.956	0.945	0.936	0.927	0.919	0.911	0.904	0.897	0.891	0.884	0.879	0.873	0.868	0.863	0.859	0.854	0.850	0.846	0.842
S8	0.894	0.887	0.881	0.875	0.869	0.863	0.858	0.854	0.849	0.845	0.841	0.837	0.834	0.830	0.827	0.824	0.821	0.818	0.816
S9	**1.000**	0.979	0.960	0.943	0.926	0.910	0.896	0.882	0.869	0.857	0.845	0.834	0.824	0.814	0.805	0.796	0.787	0.779	0.771
S10	0.910	0.903	0.896	0.890	0.884	0.878	0.873	0.868	0.863	0.859	0.855	0.851	0.847	0.844	0.840	0.837	0.834	0.831	0.829
S11	0.909	0.891	0.875	0.859	0.845	0.831	0.819	0.807	0.795	0.785	0.775	0.765	0.756	0.748	0.739	0.732	0.724	0.717	0.711
S12	0.877	0.865	0.854	0.844	0.834	0.825	0.816	0.808	0.801	0.794	0.787	0.781	0.775	0.769	0.764	0.758	0.753	0.749	0.744
S13	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.939	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940	0.940
S14	0.769	0.770	0.770	0.770	0.771	0.771	0.771	0.771	0.771	0.771	0.772	0.772	0.772	0.772	0.772	0.772	0.772	0.773	0.773
S15	0.958	0.945	0.932	0.921	0.910	0.900	0.890	0.882	0.873	0.865	0.858	0.851	0.844	0.837	0.831	0.826	0.820	0.815	0.810
S16	0.921	0.920	0.919	0.918	0.917	0.917	0.916	0.915	0.915	0.914	0.914	0.913	0.913	0.912	0.912	0.912	0.911	0.911	0.910
S17	0.884	0.875	0.866	0.858	0.850	0.843	0.836	0.830	0.824	0.818	0.813	0.807	0.803	0.798	0.794	0.790	0.786	0.782	0.778
S18	0.840	0.828	0.818	0.808	0.798	0.790	0.782	0.774	0.767	0.760	0.753	0.747	0.741	0.736	0.731	0.726	0.721	0.716	0.712
S19	0.822	0.821	0.820	0.819	0.818	0.817	0.816	0.816	0.815	0.814	0.814	0.813	0.813	0.812	0.812	0.811	0.811	0.810	0.810
S20	0.786	0.776	0.766	0.757	0.749	0.742	0.734	0.728	0.721	0.715	0.709	0.704	0.699	0.694	0.689	0.685	0.681	0.677	0.673
S21	0.787	0.768	0.750	0.733	0.718	0.703	0.689	0.677	0.664	0.653	0.642	0.632	0.622	0.613	0.604	0.596	0.588	0.580	0.573
S22	0.779	0.765	0.752	0.740	0.729	0.718	0.709	0.699	0.691	0.682	0.675	0.667	0.660	0.654	0.647	0.641	0.635	0.630	0.625
S23	0.728	0.710	0.693	0.677	0.662	0.648	0.635	0.623	0.612	0.601	0.590	0.581	0.571	0.563	0.554	0.546	0.539	0.532	0.525
S24	0.565	0.557	0.549	0.542	0.535	0.529	0.523	0.518	0.512	0.507	0.503	0.498	0.494	0.490	0.486	0.483	0.479	0.476	0.473
S25	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.484	0.483
S26	0.459	0.450	0.442	0.434	0.427	0.421	0.415	0.409	0.403	0.398	0.393	0.389	0.384	0.380	0.376	0.373	0.369	0.366	0.362
S27	0.651	0.641	0.631	0.622	0.614	0.606	0.599	0.592	0.585	0.579	0.573	0.568	0.563	0.558	0.553	0.548	0.544	0.540	0.536
S28	0.345	0.350	0.355	0.359	0.363	0.366	0.370	0.373	0.376	0.379	0.382	0.384	0.387	0.389	0.391	0.393	0.395	0.397	0.399
S29	0.177	0.178	0.179	0.181	0.182	0.182	0.183	0.184	0.185	0.186	0.186	0.187	0.188	0.188	0.189	0.189	0.190	0.190	0.191
S30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

5 Discussion, academic and managerial implications

According to the results from the empirical study that are summarized in Tables 8, "quality procedures" was ranked the topmost CSR attribute followed by "workmen's insurance" and "health and safety procedures". These results mean that Company A (the bank) places much more importance on these three as the top attributes when deciding on which supplier organization to work with when seeking to advance their corporate social responsibility agenda. This is because the case organization wants to ensure that the standard of goods and services received from their suppliers, which may indirectly or directly affect its operations, is high so as to avoid passing impact on corporate reputation and customer loyalty (Gatti et al, 2012; Chomvilailuk and Butcher, 2014). Thus, CSR is increasingly crucial for companies in other to gain competitiveness, generate wealth, respond to societal demands and support persons and society (Benitez et al, 2020). This also means that the case organization requires suppliers to have in place compensation packages for employees covering wage replacement and medical benefits for accidents occurring to their employees during employment as a way of fostering harmonious industrial relations, avoiding lawsuits and maintaining a good reputation as a caring employer. . For example, having a court action against a supplier for negligence may affect their reputation and this reputational impact on the supplier will directly or indirectly affect the reputation of the case organization. So, the case organization, just like other firms, wants to ensure that this supplier reputation damage does not occur in the first place. Furthermore, the case organization will want the supplier organization to have in place procedures to ensure adherence to established health and safety requirements for safeguarding their employees. All these requirements are to ensure that the case organization and, by extension, the supply chain members are not saddled with the supplier's direct and indirect social burden (Badri Ahmadi et al, 2017; Bai et al, 2019). Legal capability happens to be the least ranked among the attributes. This may mean that the last capability that the case organization expects from the supplier organization is legal strength. It, therefore, means that Company A expects the suppliers to strongly adhere to the highly ranked requirements, especially the top three ranked attributes instead of focusing on strengthening their capability on legal action, which may arise whenever non-compliance related issues are raised against them, since this will avoid the case organization getting into any serious societal challenges and reputational issues. Or even involve the registration of the supplier company with statutory requirements including compliance with civic responsibilities such as payment of tax.

Consequently, the study results corroborate published studies in extant literature that emphasize quality procedures, workman insurance and health and safety procedures as critical to a decision to implement CSR for sustainability advantage in the industry (Medina et al, 2021; Pereira et al, 2021; Phan et al, 2021). Moreover, the social aspect of poor labour conditions is a severe challenge in most firms, including child labour, low salaries and occupational health due to the labour-intensive nature. In this context, the

critical factors can aid in actualizing CSR goals (Chan et al, 2020). Furthermore, such critical factors for implementing CSR can translate to company's commitment to minimize harmful effects while maximizing societal benefits and also, drastically reduce the financial compensation that may accrue from service failures (Alhouti et al, 2021; Pham and Tran, 2020). Particularly, quality management aims to satisfy stakeholders and plays an important role in determining the effect of CSR on financial performance (Franco et al, 2020). Thus, companies are emphasizing critical issues aimed at achieving short-term economic goals with ethical activities aimed at generating non-economic value that supports the environment, society, institutions, arts and culture (Colucci et al, 2020; Orji et al, 2022b). Nevertheless, contrary to other published studies on the high importance of legal capability in CSR, this study has ranked legal capability as the least among the investigated CSR factors (Khan et al, 2020; Khosroshahi et al, 2021; Zhang et al, 2021). This might be attributable to the fact that highly significant CSR factors were evaluated and as such, legal capability is regarded as being of less significance in comparison with such factors. Yet, this study recommends to the banking firm and other companies that might adopt the proposed methodology to emphasize legal capability of suppliers during decisions to select socially responsible suppliers. Government regulatory bodies have launched dozens of principles, policies, guidelines, and laws to promote firms' CSR and consequently legal capability is considered critical in the success of such a venture (Zhang et al, 2021).

In addition, according to the results of the global values of all the 30 suppliers along with their rankings in Table 11, suppliers 1 and 2 are ranked the top suppliers with global weight of 1 each. Suppliers 3, 4, and 16 follow as 2nd, 3rd, and 4th respectively. Therefore, suppliers 1 and 2 are considered the best suppliers from the results and are recommended for contracting by the case banking organization. Nevertheless, since two suppliers are ranked equally at the top as computed in this study, an effective way of separating these two suppliers should be utilized if the organization decides to work with only one supplier. . The strategy may require that the case organization implements some specific post-selection evaluation and negotiations with these two suppliers to gain a better deal and possible future improvements. For example, managers of the case organization, using the results as a guide and as a part of a post-selection evaluation and negotiation project, can set higher benchmarks for the three top ranked criteria, namely, "quality procedures", "workmen's insurance", and "health and safety procedures" and consider using them to re-evaluate and negotiate with the two suppliers. The three benchmark criteria could be used to request for an improvement from the two suppliers over a period, e. g. 6 months, to ascertain which of these suppliers would make it closer to the benchmark values and could then be offered the contract. Focusing on the top three criteria for the post-selection exercise will be helpful since there may be some concerns about trying to achieve "best in-class" for all the criteria as that may be practically impossible and/or even expensive.

The results of the study also showed the critical managerial and practical

implications of the decision support model based on the Shannon- Entropy-based TODIM approach. The decision support model for solving the socially responsible supplier selection problem can be applied as a guideline for companies in utilizing an integrated methodology to prioritize the most socially responsible suppliers. It also allows the decision makers in companies to effectively estimate the performance of alternative suppliers with regard to prevailing social issues and address social sustainability objectives. Moreover, the Nigerian banking sector is highly characterized by instability due to inefficient management and fraudulent activities which tend to diminish customer satisfaction and build negative brand image (Orji et al, 2022a). Also, the persistent devaluation of the Nigerian naira and economic recession pose an unsettling challenge to the banks to be competitive and sustainable (Oboh and Ajibolade, 2017). The implementation of socially- responsible supplier selection will therefore assist the banking sector to protect its reputation, sharpen its competitive edge and actualize sustainable development. Indeed, the decision support model can assist the firms to concentrate on socially responsible suppliers and avoid suppliers whose behaviors could greatly damage the firms' operations and reputation. The considered corporate social responsibility factors can be utilized in other applications investigating a socially responsible supplier selection problem with the view to proffering solutions. The decision support model provides enough flexibility to the company's managers to effectively implement a robust socially responsible supply chain management with regards to civic responsibility, legal capability, health and safety procedures etc. Moreover, past published studies in extant literature indicate the extensive application of Shannon Entropy (Adhikari et al, 2020; Hong et al, 2021; Karagiannis and Karagiannis, 2020; Shang et al, 2022) and TODIM (see Alali and Togla, 2019; Singh et al, 2021; Singh et al, 2022; Tian et al, 2021). Thus, the use of the methodology based on Shannon-Entropy and TODIM in developing a decision support for socially responsible supplier selection in the banking sector is supported by literature.

Although the research findings is specific to the banking industry in an emerging economy- Nigeria, it does have relevant implications for other industrial sectors within the same emerging economy and other emerging economies as well (Sardana et al, 2020; Zhong et al, 2022). In other words, the study results may be applied to other companies in the developing countries and developed countries that aspire to integrate CSR issues in their supplier selection to improve their reputation and increase competitiveness, reaffirming their benefits. Thus, the current study provides a solid basis for further theorization socially responsible supplier selection in various industries for utmost performance gains in the ongoing era of increased interest in corporate social responsibility.

6 Conclusion

6.1. Summary

Globally, corporate social responsibility has been gaining momentum in supply chain management in recent times and company experts are constantly expected to emphasize social practices in their supply chain operations. An effective socially responsible supplier selection framework can lead to increased competitive edge for a firm. Presently, there is still room for improvement in the socially responsible supplier selection analytical frameworks that are available in extant literature. This paper presents a development of a Shannon-Entropy-based TODIM methodology for supplier selection by considering corporate social responsibility factors. Supplier behavior with respect to relevant corporate social responsibility factors was evaluated by decision makers. Then, the Shannon- Entropy-based TODIM framework was utilized to generate the overall ranking of the suppliers. A real case study was applied to indicate the utilization and comprehensiveness of applying the proposed Shannon- Entropy-based TODIM methodology to the socially responsible supplier selection problem. Certain managerial and practical research implications are presented based on the study findings. The current research used the developed framework in solving the socially responsible supplier selection problem for the Nigerian banking industry. Thirty suppliers were ranked in the current study with regard to CSR factors to show clarity in the benefit of the developed approach. A future research direction might be to compare the performance of the Shannon-Entropy-based TODIM approach that is developed in this study with other MCDM models such as ELECTRE and VIKOR (Vlse Kriterijumska Optimizacija Kompromisno Resenje). Although the study is based on a case study of one bank in Nigeria, this study provides a framework for other banks to assess and then select suppliers for their organizations based on the corporate social responsibility indicators. Organizations can either directly adopt this framework to assess their suppliers or they can modify a few attributes based on their organization preferences. Since this study provides not just the framework for supplier selection but also identifies and ranks the CSR attributes, other organizations can take a cue from the top ranked attributes and work on these attributes to meet their social development goals.

6.2. Limitations of the study and future research directions

The study findings have certain limitations which present opportunities for future studies on integrating CSR attributes for selecting socially responsible suppliers. For example, the framework of CSR attributes presented in this study requires a broader investigation and analysis taking into consideration a larger number of managers within the banking industry and region to assist in selecting socially responsible suppliers. Future studies can test the framework presented in this study on other banking organizations. Additionally, the approach developed in this study can be utilized to select the best possible socially responsible suppliers in another service sector (e.g a logistics firm) or manufacturing sector (e.g an electronics manufacturing firm). Further studies can also involve studying the interrelationship among the attributes of corporate social

responsibility to identify which specific attributes have influencing effect on other attributes using methodologies like DEMATEL, AHP, ANP, ISM etc. Future studies may also consider utilizing other decision models like structural equation modeling (SEM) with a larger data set within the industrial sector of the emerging economy in this study or of any other emerging economy or even developed countries. A comparison of the results obtained from this study and the results that will be obtained while applying other decision models in selecting socially responsible suppliers presents potential research opportunities.

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