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The critical success factors of using social media for supply chain social sustainability in the freight logistics industry

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Abstract

This paper pioneers the investigation of the significant factors that influence corporate decisions on the use of social media for supply chain social sustainability, and it highlights a crucial research area that is currently understudied in supply chain management literature. A theoretical framework was developed in this study based upon the Technology- Organization- Environment (TOE) and Human- Organization- Technology (HOT) theories to obtain the significant Critical Success Factors (CSFs) which influence the use of social media for supply chain social sustainability in freight logistics firms in Nigeria. The Best- Worst Method was applied to analyze and rank the CSFs using their determined relative importance level. The research findings indicate that customer satisfaction, sufficient security and privacy, affordability and competitive pressure are the highest ranked CSFs to achieve supply chain social sustainability using of social media. This research has important implications for policy makers and practitioners to gain perspectives on how to foster the use of social media in the freight logistics sector for supply chain social sustainability.

Keywords: Supply chain social sustainability, Freight logistics industry, Social media, Critical success factors, Best- Worst Method

1 Introduction

Sustainability is achieved at the interrelation of three independent triple bottom line pillars namely economic, environmental, and social (Gouda & Saranga, 2018; Hutchins et al, 2019). However, most studies available in extant literature are intensively focused on economic and environmental pillars thereby resulting in a dearth of studies in social sustainability dimension (Mangla et al., 2013; Mani et al., 2015; Kumar et al., 2018; Kumar and Anbanandam, 2019; Bai et al, 2019). Social sustainability is concerned with the human side of sustainability which addresses the issues related to quality of life and drives decision makers to consider the potential social consequences of their decisions (Mani et al., 2016a,b; Hussain et al, 2018). The organization with the ability to invest in social sustainability can enhance stakeholders' satisfaction and the firm's image thereby improving supply chain performance and increasing competitive advantage (Mani and Gunasekaran, 2018; Mani et al., 2018). Particularly, the freight logistics sector is in dire need of actualizing social sustainability due to their strategic role in the successful implementation of competitive strategies of which social issues are equally important for facilitating the managing of the complex and increasingly global supply chains (Holl and Mariotti, 2018). Nevertheless, logistics is a part of supply chain management and has recently become substantially more important as a result of globalization as well as advanced technologies (Kucukaltan et al, 2016). While the transportation of goods is the primary outcome of logistics service supply chains (Ambra et al., 2019), providing an integrative and systemic support function in order to address the time and place discrepancy in transportation is equally important (Havenga and Simpson, 2018). To improve positive transportation outcomes, logistics firms should move beyond movement of goods towards enhancing customers' satisfaction

and firms' image, which is the main objective of social sustainability. The key to that is attaining effective integration of business functions and channel members through the use of innovations (Hussain et al, 2018).

While previous studies in extant literature reveal that social sustainability has been scantily researched, the area still lacks in theoretical and empirical studies (Marshall et al., 2015; Badri Ahmadi et al., 2017; Khan et al, 2018; Mani and Gunasekaran, 2018). The social sustainability dimension has been emphasized largely for legal requirements, human safety or legislative framework (Gualandris & Kalchschmidt, 2016; Sodhi, & Tang, 2018; Rajesh, 2019), leaving the area of the innovations for social sustainability largely unexplored. Social media is one of the innovations which can aid in achieving social sustainability since it enables firms and their supply chains to share resources and information and engage in cooperative actions for mutual benefits (Zhang and Zhang, 2018). The proliferation of social media coincides with firms expanding social sustainability paradigm, in which firms integrate new ideas and feedbacks from various internal and external sources (Muninger et al, 2019). Social media technologies can provide a potent means for firms to manage their information flows and thus induce changes in their social sustainability systems, which can be linked to performance improvements (Nisar et al, 2019; Chaudhuri & Jayaram, 2019). The use of social media can provide user-generated content and social networks that reflect customers' preferences, to enhance the social sustainability of firms and their supply chains (Munzel et al, 2018). Although freight logistics firms are under pressure to achieve social sustainability in their supply chains (Ajmal et al, 2018), the critical success factors to adopting social media for supply chain social sustainability has not been methodically investigated. Moreover, the studies on social sustainability in the logistics sector have concentrated on developed nations leaving the developing nations largely unexplored (Kumar and Anbanadam, 2019). However, the rapid development of the freight logistics sector in developing nations accelerates the optimization and adjustment of the industrial structure, advances the transformation of economic growth, and thus promotes a rapid economic development (Gao et al, 2018).

Based on the above discussion, this study aims to identify the critical success factors and develop a model that incorporates different factors from the perspectives of the "technology, organization, human and environment (institution)" to inform the adoption and use of social media for logistics supply chain social sustainability in a developing country, Nigeria. With the growing interest in firm's social sustainability for increased competitiveness, the huge pressure to consider the stakeholders' requirements and prevent exploitation of human and social resources in the freight logistics sector have created the need to model different critical factors that influence social media use in the freight logistics sector. Also, it is obvious that ranking the CSFs can assist the government agencies and the freight logistics industry to focus on the most significant factors when assigning their resources for social sustainability implementation through different practices (Yadegaridehkordi et al, 2018). Yet still, there is paucity of available published literature on the modeling and ranking of these CSFs that influence social media adoption for freight logistics social sustainability. Thus, this study aims to address the following research questions:

RQ1 How can a suitable theoretical model be developed to ensure the effective adoption of social media for supply chain social sustainability of the freight logistics sector?

RQ2 How does Best- Worst Model help to identify and rank the most significant critical success factors that contribute to the use of social media for freight logistics supply chain sustainability?

Thus, this study contributes to the literature in several ways. First, it extends the literature on social sustainability by reviewing and extracting the critical success factors for the use of social media. Next, a theoretical model was developed from a multi-theoretic perspective by integrating “Technology- Organization- Environment” (TOE) and “Human- Organization- Technology” (HOT) theories to determine the significant factors that can contribute to the successful implementation of social media technologies in the logistics sector. Then, as a response to the calls for a systemic approach to social sustainability (Hussain et al, 2018), the Best- Worst Method was employed to practically implement the theoretical model based on the logistics and supply chain managers’ perspective in the Nigerian logistics sector. The Best- Worst Method applied in this study is a multi-criteria decision-making model which uses two vectors of pairwise comparisons to determine the weights of criteria (Rezaei, 2015). Thus, the best criterion and worst criterion are determined in the Best- Worst Method as the most important criterion and least important criterion respectively thereby leading to low inconsistency of the results and lesser complicated process (Shojaei, 2018). Many studies exist in extant literature on the successful application of the Best- Worst Method in various research domains (Aboutorab et al, 2018; Kusi- Sarpong et al, 2018; Wang et al, 2019). Hence, the novelty of this research lies in the application of the critical success theory within the Technology- Organization- Environment and Human- Organization- Technology theoretical perspectives to study the use of social media in the Nigerian freight logistics sector to achieve social sustainability. This will ensure an active interaction between the transportation companies and their stakeholders/ consumers in the Nigerian freight logistics sector thereby supporting social sustainability to improve supply chain performance. The Nigerian freight logistics industry is one of the most important sectors which contribute to the country’s economy due to the expansion of international trade in Nigeria (Faajir and Zidan, 2016). In fact the GDP from transportation activities reached an all-time high in fourth quarter of 2018 with over 280,000 NGN millions. This is because the freight logistics sector in Nigeria forms the basis of all socio- economic interactions by providing sectoral connections within the local economy and connecting the domestic economy to the international economy (Gani, 2017). In response to this, the freight logistics industry in Nigeria and the relevant government bodies makes continuous efforts to enhance the quality of logistics services while keeping pace with the huge demand for transportation. This may result in stronger competitive pressures to capture the significant share of core customers in the Nigerian transport market thus, giving rise to this study on the critical success factors for the use of social media for freight logistics supply chain social sustainability in Nigeria. This study can assist the logistics/ supply chain managers and policy makers in Nigeria (and other developing nations) in predicting the critical

success factors for a successful implementation of social sustainability that can eventually provide economic benefits and increased competitiveness.

The remainder of the paper is organized as follows: In Section 2, the relevant literature including the supply chain social sustainability, identification of the factors which influence social media use and the application of critical success factors in sustainability research is reviewed and discussed. In Section 3, the research modeling framework is presented. Next, Section 4 discusses the results and implications of the study followed by Section 5 which highlights the conclusions of the research.

2 Literature review

In the supply chain and operations literature, social sustainability refers to the product and process aspects that impact the people involved in the supply chain (Maniand Gunasekaran, 2018). It is referred to as the human side of achieving sustainability objectives in supply chain systems so as to increase competitive advantage (Hussain et al, 2018). In response to globalization, supply chain systems have extended their reach and have made developing countries integral parts of the total systems (Popovic et al, 2018). Past studies exist in the literature on social sustainability in the supply chain of developing countries, most of which concentrated on social sustainability measures and practices without considering the critical success factors of innovations for social sustainability in the logistics sector (Pathak et al., 2019). Mani and Gunasekaran (2018) explored how pressures from customers, sustainability culture, government, and external stakeholders act as primary constituents of the firm in determining the extent to which firm consider the adoption of supply chain social sustainability in developing countries. Also, their work fails to provide a perspective on the drivers for the adoption of innovation for supply chain social sustainability. However, Kumar and Anbanandam (2019) proposed a framework for computing social sustainability index, which is based on the freight transportation social sustainability enablers, dimensions and attributes. Although, their study is grounded in the logistics sector of a developing country, it fails to give an outlook of the drivers for the use of innovation for supply chain social sustainability. An adequate evaluation of the critical success factors for the adoption of innovation in the logistics sector to achieve supply chain social sustainability is important to enhance logistics firms' image and increase competitive advantage.

In this context, social media is positioned as an innovation to achieve supply chain social sustainability through enhancing efficient information flow from internal and external sources (Nisar et al, 2019). Currently, social media has been widely adopted to spur social sustainability in operations and supply chain management (Singh et al, 2018; Wang et al, 2019). However, literature is scarce on the critical success factors for the use of social media for supply chain social sustainability and in particular in the logistics industry. Usually, the use of social media just like other innovations for supply chain social sustainability is influenced by critical success factors which govern every aspect of decisions and processes in the firm and its supply chain (Ahmadi et al, 2015). The concept of critical factors has been applied in various domains since its inception including supply chain social sustainability (Awan et al, 2018). In this paper, we focus

on the logistics industry in Nigeria to examine the critical success factors for the use of social media to achieve supply chain social sustainability. Nevertheless, the critical success factors for the use of social media relates to the inherent organizational characteristics, human aspects, technological change and environmental externalities (Yadegaridehkordi et al, 2018). A comprehensive framework of these critical factors based upon the Technology- Organization- Environment (TOE) and Human-Organization- Technology (HOT) theoretical models will assist management to make vital efforts to achieve supply chain social sustainability and increase competitiveness. TOE is one of the prominent theoretical frameworks with extensive applicability within different research contexts (Tashkandi and Al- Jabri, 2015; Liu, 2011; Wu and Chen, 2014; Yang et al, 2012). TOE is suggested as a comprehensive lens to identify critical factors for technological innovations in the early stage of diffusion at the organization level by encompassing and focusing on the necessary characteristics (Nilashi et al, 2015). On the other hand, HOT is an evolutionary organizational framework that has been applied to study innovation adoption in various research fields (Ahmadi et al, 2018; Lian et al, 2014; Marques et al, 2011; Tsiknakis and Kouroubali, 2009; Yusof et al, 2008). HOT builds upon the premise that human and organizational aspects are essential as much as technical issues in connection to the system effectiveness in starting the innovation diffusion as it accounts for important strategies influencing the innovation investment (Ahmadi et al, 2015). The TOE and HOT models has been integrated in previous studies to predict the critical factors that directly affect an organization's decisions (Ahmadi et al, 2015; Nilashi et al, 2016). Usually, integrated models tend to show a significant improvement in the variance when compared to the traditional models (Ahani et al, 2017; Zhou et al, 2010). Researchers insist that an integrated approach of theories is needed as a lens to be applied in determining the adoption of a specific innovation (Ahmadi et al, 2018). Nevertheless, the adoption of information technologies is importantly maintained through inter- organizational relationships thereby necessitating that macro perspectives grounded on such interactions be considered as a conceptual ground (Yaeger et al, 2014). Hence, this study will integrate TOE and HOT models to provide a comprehensive set of dimensions and critical factors that ideally actively predict the use of social media in the logistics sector. The managerial and practical implications of the study are provided to encourage the use of social media for the successful implementation of logistics supply chain social sustainability in Nigeria.

2.1. Identification of critical success factors for social media use in logistics

The theoretical decision framework developed in this study focuses on technological, organizational, external environmental (institutional) and human dimensions that significantly impact the use of social media for logistics supply chain social sustainability (see Table 1). Within each of these dimensions, there are critical factors that were identified through a combination of previous studies and opinions of logistics industry experts.

Table 1 A theoretical framework on the critical factors of social media use in the logistics sector

| Dimensions | Factors | References |
|---------------------|--|---|
| Technological (TL) | Efficient technology (TL1) | Ahmadi et al, 2015; Brock and Khan, 2017; Kuo and Smith, 2018; Lian et al, 2014; Pacheco et al, 2018; Shin, 2016; |
| | Affordability (TL2) | Yadegaridehkordi et al, 2018 |
| | Compatible technology facilities (TL3) | |
| | Perceived benefits (TL4) | |
| | Sufficient privacy and security (TL5) | |
| Organizational (OG) | Organizational culture (OG1) | Adnan et al, 2017; Brock and Khan, 2017; Kwoon et al, 2014; |
| | Positive attitude towards social media (OG2) | Luthra et al, 2016; Nilashi et al, 2016; Sun et al, 2016 |
| | Firm size and organizational structure (OG3) | |
| Institutional (IT) | Government support and policies (IT1) | Ahmadi et al, 2015; Gupta and Barua, 2016; Nilashi et al, 2016; |
| | Demand volatility of logistics services(IT2) | Orji, 2019; Pacheco et al, 2018; Sun et al, 2016; Verma et al, 2017; Sun et al, 2016 |
| | Competitive pressure (IT3) | |
| Human (HM) | Employee competence and training (HM1) | Ahmadi et al, 2015; Elbaz and Haddoud, 2017; Gardas et al, 2019; Gupta and Barua, 2016; |
| | Customer satisfaction (HM2) | Lian et al, 2014; Orji and Liu, 2018; Sun et al, 2016; |
| | Proper communication among partners (HM3) | Yadegaridehkordi et al, 2018 |
| | Team commitment and involvement (HM4) | |
| | Top management commitment and support (HM5) | |

2.1.1. Technological context

The technological factors encompass the firms' external and internal technologies with both process and equipment which describes innovation characteristics that have been used in prior innovation adoption studies (Nilashi et al, 2016). Efficient technology is a critical factor within this context, which entails that the availability and effective utilization of technological tools can foster the adoption of social media to ensure supply chain social sustainability (Shankar et al, 2018). Affordability is also an important factor that can influence the use of social media for logistics supply chain social sustainability which can be defined as the extent to which social media is perceived as relatively easy to acquire due to available financial resources (Shin, 2016). Another factor that relates to the technological context is compatibility which defines how well social media is well- suited to prospective adopters' values, experience, and needs (Ahmadi et al, 2015). Also, perceived benefits of social media is another critical factor in this context which considers the useful perceptual level of social media as compared to other preceding innovations. Additionally, being in compliance with sufficient privacy and security can foster the use of social media for social sustainability objectives.

2.1.2. Organizational context

Logistics companies can be influenced by critical factors which are related to the

organizational context when using social media for supply chain social sustainability. The organizational dimension involves characteristics, resources and attributes of a firm (Elbaz and Haddoud, 2017). Organizational culture is an important factor within this context, in that using social media for logistics supply chain social sustainability can be fostered when improvement culture is embedded with the firm and its supply chain (Adnan et al, 2017). Positive attitude towards social media is another influential factor in the use of social media in the logistics sector which is largely precipitated by the awareness of the substantial benefits of its use for supply chain social sustainability (Kwoon et al, 2014). Positive attitude can be a driver to adopt innovative strategies to achieve sustainability goals (Orji, 2019). Firm size and organizational structure is another factor within this context which influences the use of social media in the logistics sector (Sun et al, 2016). This factor encompasses the company size in terms of the number of employees and total output in addition to the hierarchical structure of the organization.

2.1.3. Institutional context

The factors within the institutional context are associated with the environmental externalities of a firm which constitutes the pressures and support from the external environment of the firm (Yadegaridehkordi et al, 2018). Government support and policies is prominent factor within this context that influences the use of social media for supply chain social sustainability in the logistics industry. Currently, logistics/supply chain managers decry the absence of government guidelines and incentives in developing countries including Nigeria to encourage the implementation of relevant strategies for supply chain sustainability (Mani and Gunasekaran, 2018). Demand volatility which is as result of the huge demand for logistics services and fluctuations in demand is also an important factor within this context (Nguyen, 2013). Competitive pressure is also a crucial factor within the institutional context which can influence the use of social media for logistics supply chain social sustainability.

2.1.4. Human context

Logistics firms are influenced by factors which relate the human and behavioral aspects of the organization. Employee competence and training is an important factor within the human context which can influence the use of social media for supply chain social sustainability (Elbaz and Haddoud, 2017). Employee competence refers to the capability of employees within an organization to adopt new business strategies to improve performance and increase competitive advantage. Competent employees are valuable human resources that consistently seek solutions to emerging business problems and capitalize on imminent opportunities using innovative technologies (Nilashi et al, 2016). Thus, employees need to be educated and trained to acquire skills, quality concepts, and attitudes to follow the standards and continuous improvements in which they contribute (Yadegaridehkordi et al, 2018). Customer satisfaction is also crucial within this context to influence the use of social media in the logistics sector. Proper communication among partners is a critical factor within this context which can influence the use of social media for supply chain social sustainability (Kwoon et al, 2014). Also, team commitment and involvement can enhance the use of social media for logistics supply chain social sustainability. Top management is a significant factor

within the human context which influences the use of social media in the logistics sector (Gardas et al, 2019).

2.2. Application of critical success factors theory in the logistics sector

This study applies the theory of critical success factors to investigate the use of social media for logistics supply chain social sustainability in Nigeria. The theory of critical success factors entails concentrating on the limited number of areas in which results if they are satisfactory will ensure successful competitive performance for the organization (Shankar et al, 2018). Many authors have used the theory of critical success factors to solve various problems in the logistics supply chain field and have found the concept to be efficient in such scenarios. Table 2 shows the various application of the concept of critical success factors by different authors to study problems in the logistics industry.

Table 2 Application of CSF theory in the logistics industry

| Authors | Nature of contribution |
|------------------------|---|
| Shankar et al, 2018 | Modeling the implementation of traceability systems |
| Nguyen, 2013 | E- business adoption |
| Colicchia et al, 2013 | Building environmental sustainability |
| Evangelista, 2014 | Exploratory case study investigation for environmental sustainability |
| Tsai and Tang, 2014 | Adoption of radio frequency identification technology |
| Kucukaltan et al, 2016 | Performance indicators for competitiveness |
| Mothilal et al, 2011 | Performance indicators for increased competitive advantage |
| Gupta. et al, 2018 | Sustainable service quality management |

3 Research methodology

The proposed research modeling framework in this study consist of the steps to prioritizing the critical factors for the use of social media by determining their relative importance to logistics supply chain social sustainability in Nigeria using the Best-Worst Method is shown in Fig. 1.

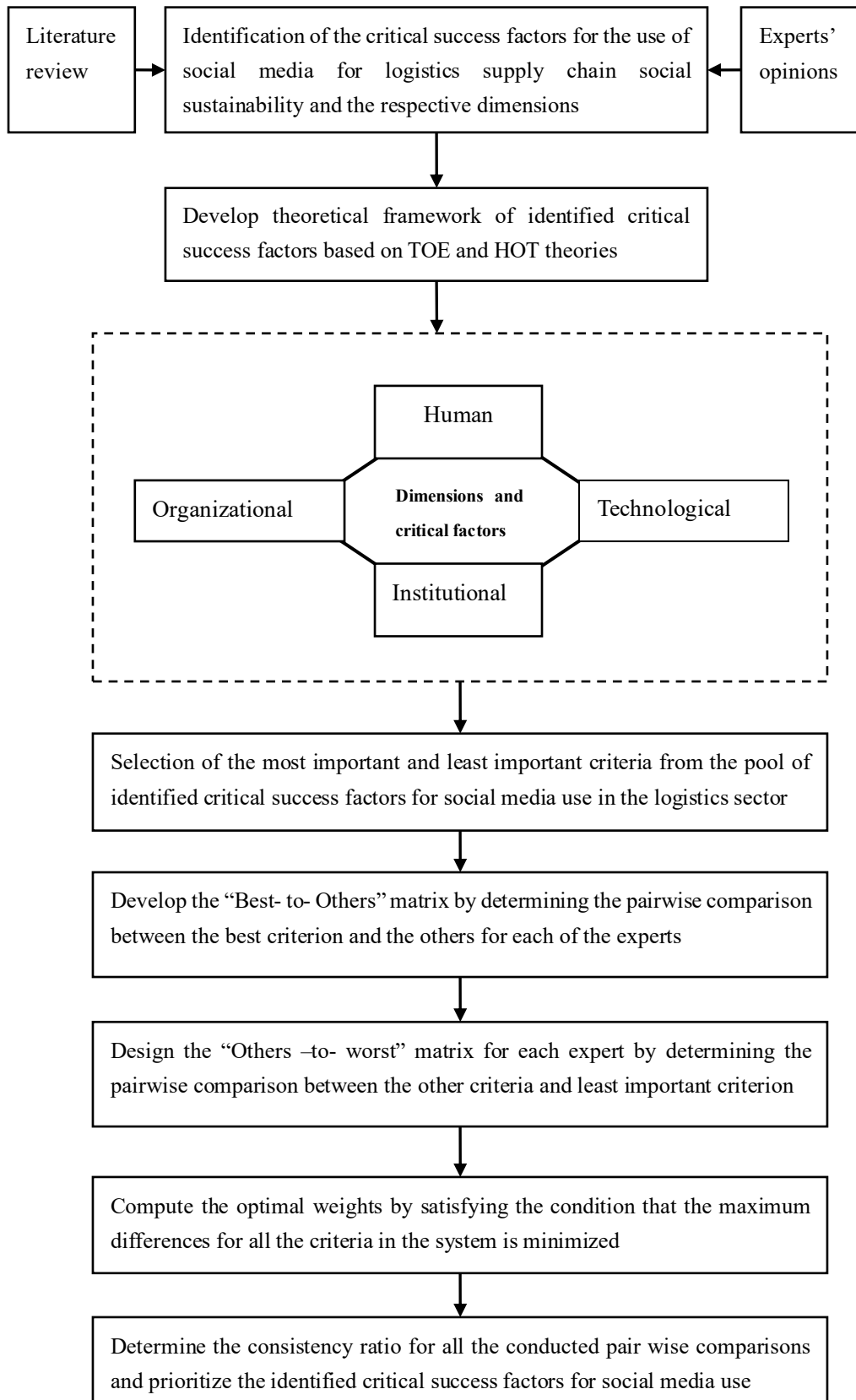


Figure 1. Research modeling framework

As earlier discussed, the use of social media would significantly contribute towards actualizing social sustainability objectives in the logistics supply chain. For the

effective use of social media in the logistics industry, a comprehensive understanding of the critical success factors would facilitate decision makers to evaluate the relative importance of these factors and subsequently make informed decisions. This study attempts to first identify the critical success factors and then categorized them using the TOE and HOT models. The relative importance of the identified factors is further analyzed using the Best- Worst Method.

Past studies have employed Best- Worst Method (BWM) as their solution methodology. Wang et al (2019) applied the BWM to analyze the risks of energy performance contracting. Yadav et al., (2018) integrated BWM with ELECTRE to evaluate enablers of offshore outsourcing adoption in four automotive companies in India. Aboutorab et al (2019) employed an extension of the BWM in supplier development problem. Kusi- Sarpong et al (2018) employed the BWM to evaluate innovation factors in the supply chain sustainability framework while Gupta and Barua (2017) applied it for supplier selection based on green innovation ability. Rezaei et al (2018) applied the model to measure the relative importance of the logistics performance index indicators. Zhao et al. (2018) evaluated the benefits of eco-industrial park using BWM based circular economy and sustainability. Currently, it is evident from available literature that no study has focused on analyzing the critical success factors for the adoption and use of social media in the logistics sector by applying the Best- Worst Method. Further, BWM is used because it requires lesser pairwise comparisons and hence fewer data points as compared to other prominent MCDM techniques like AHP (Rezaei, 2016). Also as per Rezaei (2016), BWM gives more consistent results as compared to AHP. This study makes contributions in this direction.

3.1. Best- worst method

The Best- Worst Method (BWM) is a multi- criteria decision making model which determines the weights of criteria by employing two vectors of pairwise comparisons of the most important and least important criteria (Wang et al, 2019). The following steps are involved in deriving the weight of criteria using the Best- Worst Method (Rezaei 2016):

Step 1: Finalization of decision criteria

A set of decision criteria are identified and finalized from literature review and experts' opinions and denoted as $\{c_1, c_2... c_n\}$ for n main criteria. In this study, the decision criteria are the critical success factors for the use of social media for logistics supply chain social sustainability in Nigeria.

Step 2: Select the best (most important) and worst (important) criteria.

Here, the expert selects the most important and least important criteria from the pool of identified decision criteria in Step 1 based on his/ her opinion.

Step 3: Develop a matrix by determining the pair wise comparison between the most important criterion and the other decision criteria.

The aim of this step is to ascertain the preference of the most important criterion to the other decision criteria by using a linguistic scale for the Best- Worst Method having scores from 1 to 9. The linguistic scale is shown in Table 3.

Table 3 Linguistic scale for pairwise comparison in Best- Worst Method

| Linguistic attributes | Scores |
|---|--------|
| Equally important | 1 |
| Equal to moderately more important | 2 |
| Moderately more important | 3 |
| Moderately to strongly more important | 4 |
| Strongly more important | 5 |
| Strongly to very strongly more important | 6 |
| Very strongly more important | 7 |
| Very strongly to extremely more important | 8 |
| Extremely more important | 9 |

The result of the pair wise comparison of the best criterion and other decision criteria is expressed by a “Best- to- Others” vector as follows:

$$D_B = (d_{B1}, d_{B2}, \dots, d_{Bn})$$

Where, d_{Bj} represents the preference of the most important criterion B over a criterion j amongst the decision criteria, and $d_{BB} = 1$

Step 4: Develop the “Others –to- Worst” matrix by conducting a pair- wise comparison of the other decision criteria over the least important criterion using the linguistic scale for Best- Worst Method shown in Table 3. The result of comparison of the other decision criteria to the worst criterion is shown as follows:

$$D_W = (d_{W1}, d_{W2}, \dots, d_{Wn})^q$$

Where, d_{Wj} represents the preference of the criterion j amongst the decision criteria in Step 1 over the least important criterion W , and $d_{WW} = 1$.

Step 5: Computing the optimal weights $(p^*_1, p^*_2, \dots, p^*_n)$

Determine weights of criteria such that the maximum absolute differences for all criterion j are minimized over the following set $\{|p_B - d_{Bj}p_j|, |p_j - d_{jW}p_W|\}$.

A minimax model can be formulated as:

$$\min \max_j \{|p_B - d_{Bj}w_j|, |p_j - d_{jW}w_W|\}$$

Subject to:

$$\sum_j p_j = 1 \tag{1}$$

$$p_j \geq 0, \text{ for all criterion } j$$

Model (1) can be solved by converting it into the following linear programming problem model:

$$\text{Min } R^L$$

Subject to:

$$|p_B - dp_j| \leq R^L, \text{ for all criterion } j$$

$$|p_j - dp_W| \leq R^L, \text{ for all criterion } j$$

$$\sum_j p_j = 1$$

$$p_j \geq 0, \text{ for all criterion } j \quad (2)$$

Solving the linear model (2), will result in optimal weights ($p_1^*, p_2^* \dots p_n^*$) and optimal value R^L . Consistency (R^L) of comparisons also needs to be determined. A value closer to 0 is more desired for consistency (Rezaei, 2016; Wang et al, 2019).

3.2. Data collection

In this study, questionnaires were designed and used to collect data from managers with a minimum of five years of professional management and decision making experience in the Nigerian freight logistics sector to ensure accuracy of data collected since the experts were deemed to be knowledgeable to effectively complete survey. The managers were from 3 randomly selected fastest growing Nigerian freight logistics firms and were assured of the confidentiality of their reports so as to allow for effective model- building and in- depth observation (Nilashi et al, 2016). Furthermore, the managers were designated mid- level and above ranking executives, thus their responses sufficiently represent the freight logistics sector (Fu et al, 2006). The 3 selected freight logistics companies are similar in their commitment to procure information technology. In fact, the firms have formed cross functional teams consisting of 4 categories of managers namely logistics manager, director, general manager and information technology manager to maximize the benefits from such a venture. In addition, the freight logistics companies are under pressure to balance customer demands with government requirements to achieve sustainable objectives. The companies are also similar in their firm size and logistics operations profile. These similarities can aid in illuminating significant patterns in the data and encourage robust observation (Eisenhardt and Graebner, 2007).

Several procedures were carried out to maximize the rate of response and minimize response bias amongst the managers in the selected logistics firms during the survey. Firstly, a pilot- test was carried out by sending the questionnaires designed for this work to three researchers via emails and conducting face- to - face interviews with three logistics/ supply chain manager in Nigeria to review and provide feedbacks. The three researchers that participated in the pilot- test comprises of a female and two males who are within the age group of 25- 39years, hold PhD degrees and have more than five years of research experience in supply chain management. The logistics managers who participated in the pilot- test are within the age group of 40- 55 years and have managerial experience between five and ten years in the Nigerian freight logistics industry. Based on the feedbacks from the pilot- test, the questionnaires were further modified and emailed to 30 managers, 10 each from the 3 selected firms who are part of the 4 categories of managers that are involved in the decision to procure information technology in the Nigerian freight logistics industry. This was done to ensure a

minimum of 3 respondents in each selected category of managers and thereby provide in-depth investigation of experts' opinions. Then, follow-up was carried out through phone conversations and personal visits (Yang et al, 2018) after which 18 completed questionnaires were received out of the 30 questionnaires that were emailed to the managers, a response rate of 60%. The number of completed questionnaires is deemed suitable for efficient analysis and to provide reliable findings because the Best- Worst Method applied in this work does not require a large sample size to provide accurate and reliable results (Wang et al, 2019; Shojaei et al, 2018). The demographics summary of the 18 respondents is shown in Table 4.

Table 4 Demographics summary of respondents

| Characteristic | Number of respondents | Percentage of samples (%) |
|--|-----------------------|---------------------------|
| Age | | |
| 25- 39 | 7 | 38.9 |
| 40-55 | 11 | 61.1 |
| Gender | | |
| Male | 12 | 66.7 |
| Female | 6 | 33.3 |
| Education | | |
| Bachelor degree | 5 | 27.8 |
| Postgraduate degree | 13 | 72.2 |
| Years of experience | | |
| 5- 10 | 6 | 33.3 |
| Above 10 | 12 | 66.7 |
| Roles | | |
| Logistics manager | 6 | 33.3 |
| Information Technology manager | 4 | 22.2 |
| General manager | 5 | 27.8 |
| Director, Strategy | 3 | 16.7 |
| Annual revenue (million naira) | | |
| 5- 99 | 13 | 72.2 |
| 100- 500 | 5 | 27.8 |
| Firm size (number of employees) | | |
| 20- 99 | 8 | 44.4 |
| 100- 200 | 10 | 55.6 |

In this research, the survey was conducted with 18 respondents with detailed information on Table 4 by using two sets of questionnaires. The first set of questionnaires which is divided into two parts was aimed at finalizing the identified critical factors for the use of social media in the Nigeria logistics sector. The first part comprises of the demographic characteristics of the respondents and definitions of the critical factors (for details see Section 2.1). The second part of the questionnaire included questions to determine whether the identified factors are 'relevant' or 'not relevant' in the Nigerian logistics industry. The second set of questionnaires was aimed at determining the relative importance of the finalized critical factors for logistics

supply chain social sustainability. A t- test was used to examine the non- response bias and ability of the findings to be generalized to the sample population by checking for any significant difference in the demographic characteristics of number of employees and annual revenue costs between the first and second half of the time period (Feng et al, 2018). The results of the t- test show no critical differences ($p < 0.06$) between the two groups of data, thus indicating that responses were basically an unbiased sample.

4 Results and discussion

As the first step of the Best- Worst Method, the dimensions and critical success factors for social media use that have been derived from literature review are evaluated by the decision makers using questionnaires. The questionnaires were designed to require a ‘YES’ or ‘NO’ response which signifies that a critical success factor or dimension is ‘relevant’ or ‘not relevant’ in the Nigerian logistics sector respectively required to include omitted variables. A simple mean method was applied to select the variables that are above the arithmetic mean and the result analysis in this stage show that all the identified critical factors and dimensions were accepted with no further inclusions. Thus, the content validity was confirmed while ensuring inclusiveness of relevant information.

4.1 Calculation of the weights of critical success factors (CSFs) using Best- Worst Method (BWM)

Subsequent to the finalization of the CSFs for social sustainability using social media, the next step is to calculate the weights of the CSFs using BWM. In this study eighteen experts carried out the identification of the best and worst criteria among the main category criteria as well as subcategory criteria. After obtaining the best and worst criteria, all the experts were requested to give preference ratings of the best criteria to other criteria and other criteria to worst criteria for the main category criteria CSFs as well as subcategory criteria CSFs. The preference ratings obtained by Expert 1 for main category criteria CSFs is shown in Table 5 below:

Table 5 Pairwise comparison of main category CSFs by Expert 1

| Best to Others | Technological(TL) | Organizational(OG) | Institutional(IT) | Human(HM) |
|---------------------------|-------------------|-----------------------------------|-------------------|-----------|
| Best criteria: | 1 | 4 | 6 | 9 |
| Technological (TL) | | | | |
| Others to Worst | | Worst criteria: Human (HM) | | |
| Technological (TL) | | 9 | | |
| Organizational (OG) | | 4 | | |
| Institutional (IT) | | 2 | | |
| Human (HM) | | 1 | | |

Similarly, all the experts were asked to rate the subcategory CSFs; the preference ratings given by Expert 1 for subcategory CSFs are shown in Tables 6, 7, 8, 9. Table 6 shows the performance ratings by Expert1 for Technological (TL) subcategory CSFs.

Table 6 Pairwise comparison of Technological (TL) critical factors by Expert 1

| Best to Others | <i>TL1</i> | <i>TL2</i> | <i>TL3</i> | <i>TL4</i> | <i>TL5</i> |
|---------------------------|------------|------------|----------------------------|------------|------------|
| Best criteria: <i>TL4</i> | 9 | 7 | 3 | 1 | 2 |
| Others to Worst | | | Worst criteria: <i>TL1</i> | | |
| <i>TL1</i> | | | 1 | | |
| <i>TL2</i> | | | 2 | | |
| <i>TL3</i> | | | 6 | | |
| <i>TL4</i> | | | 8 | | |
| <i>TL5</i> | | | 5 | | |

The performance ratings by Expert 1 for Organizational (OG) subcategory CSFs is shown in Table 7.

Table 7 Pairwise comparison for Organizational (OG) critical factors by Expert 1

| Best to Others | <i>OG1</i> | <i>OG2</i> | <i>OG3</i> |
|---------------------------|------------|----------------------------|------------|
| Best criteria: <i>OG2</i> | 2 | 1 | 7 |
| Others to Worst | | Worst criteria: <i>OG3</i> | |
| <i>OG1</i> | | 3 | |
| <i>OG2</i> | | 6 | |
| <i>OG3</i> | | 1 | |

Table 8 shows the performance ratings for Institutional (IT) subcategory critical success factors by Expert 1.

Table 8 Pairwise comparison for Institutional (IT) critical factors by Expert 1

| Best to Others | <i>IT1</i> | <i>IT2</i> | <i>IT3</i> |
|---------------------------|------------|----------------------------|------------|
| Best criteria: <i>IT3</i> | 6 | 7 | 1 |
| Others to Worst | | Worst criteria: <i>IT2</i> | |
| <i>IT1</i> | | 2 | |
| <i>IT2</i> | | 1 | |
| <i>IT3</i> | | 7 | |

The performance ratings as determined by Expert 1 for the critical success factors in the Human (HM) main category are shown in Table 9.

Table 9 Pairwise comparison for Human (HM) critical factors by Expert 1

| Best to Others | <i>HM1</i> | <i>HM2</i> | <i>HM3</i> | <i>HM4</i> | <i>HM5</i> |
|---------------------------|------------|------------|----------------------------|------------|------------|
| Best criteria: <i>HM4</i> | 9 | 7 | 2 | 1 | 3 |
| Others to Worst | | | Worst criteria: <i>HM1</i> | | |
| <i>HM1</i> | | | 1 | | |
| <i>HM2</i> | | | 3 | | |
| <i>HM3</i> | | | 6 | | |
| <i>HM4</i> | | | 8 | | |
| <i>HM5</i> | | | 5 | | |

The same procedure was carried out by all the experts in this study to determine the performance ratings of the main category and subcategory CSFs of social media adoption for supply chain social sustainability. The weights of all the CSFs in the main category and subcategory considered in this study were obtained using Eq. (1). The aggregated weights of all the main category and subcategory CSFs was computed by applying the data sourced from the eighteen experts in this study in Eq. (2) and calculating the mean using simple average method as presented in Table 10.

Accordingly the final results of the evaluation process embarked upon using the Best- Worst Model is depicted on Table 10, the following are presented for discussions:

1. Ranking of the Technology, Organization, Institution and Human dimensions
2. Global ranking of the critical success factors for the use of social media in the logistics industry
3. Ranking of individual critical success factors within each dimension

The extent of the importance of the challenges is identified by its ranking position in the table. The global rank of the identified challenges also shown in Table 10 is computed by multiplying the preference weights of the respective challenge's dimension and the respective weight of the challenge. The ranking of the main category dimensions and sub- category challenges is discussed in detail in the next section.

Table 10 Aggregate weights of main and subcategory CSFs for all the experts

| Main category CSFs | Weights of main category CSFs | Subcategory CSFs | Weights of subcategory CSFs | Global weights | Ranking |
|---------------------|-------------------------------|------------------|-----------------------------|----------------|---------|
| Technological (TL) | 0.353 | TL1 | 0.128 | 0.045 | 10 |
| | | TL2 | 0.240 | 0.085 | 4 |
| | | TL3 | 0.067 | 0.024 | 14 |
| | | TL4 | 0.218 | 0.077 | 6 |
| | | TL5 | 0.348 | 0.123 | 2 |
| Organizational (OG) | 0.079 | OG1 | 0.385 | 0.030 | 12 |
| | | OG2 | 0.531 | 0.042 | 11 |
| | | OG3 | 0.085 | 0.007 | 16 |
| Institutional (IT) | 0.218 | IT1 | 0.387 | 0.387 | 5 |
| | | IT2 | 0.093 | 0.093 | 15 |
| | | IT3 | 0.520 | 0.520 | 3 |
| Human (HM) | 0.351 | HM1 | 0.077 | 0.077 | 13 |
| | | HM2 | 0.400 | 0.400 | 1 |
| | | HM3 | 0.153 | 0.153 | 9 |
| | | HM4 | 0.188 | 0.066 | 7 |
| | | HM5 | 0.182 | 0.064 | 8 |

4.2. Ranking of the dimensions of the critical success factors for social sustainability

The results indicate that the critical success factors under the technological dimension are the major critical success factors which influence the use of social media to achieve supply chain social sustainability in the Nigerian logistics sector. These are

followed by the human dimension, institutional dimension and lastly the organizational dimension. The critical success factors that are related to the technological context are very important and should be adequately ensured during the use of social media for supply chain social sustainability in the logistics sector. The second dimension is human, which is associated with the human and behavioral aspects of the company is highly critical to the use of social media in the logistics sector to achieve supply chain social sustainability. The institutional- related critical factors are the next in line with regards to achieving social sustainability in the logistics sector through the use of social media technologies. The organizational dimension is ranked least amongst the main category dimensions of the CSFs in this study. The managers in the logistics sector must be encouraged to be in compliance with these critical success factors to ensure the use of social media to achieve supply chain social sustainability.

4.3. Global rank of the critical success factors

The global ranking of the critical success factors for social media use to achieve social sustainability is outlined in Table 10. The top four critical success factors under global ranks belong to all the other dimensions considered in this study with the exception of the organizational dimension. These top critical success factors include customer satisfaction, sufficient privacy and security, competitive pressure and affordability. Customer satisfaction is the highest ranking critical success factor for social media use to actualize social sustainability objectives. Customer satisfaction entails the focusing of efforts on making value for customers while managing their preferences and expectations so as to improve firms' performance and increase competitiveness (Ferreira and Fernandes, 2015). Another highly ranked critical success factor for social media use in the logistics sector is sufficient privacy and security. Affordability is also a highly ranked critical success factor in this study. The logistics industry can effectively adopt social media if there is sufficient funding to enhance its affordability for use to achieve supply chain social sustainability. Sufficient funding can provide financial resources to pay for installation costs, implementation of any subsequent enhancements and ongoing expenses during usage (Nilashi et al, 2016). Another highly ranked critical success factor is competitive pressure. In Nigeria, just like in most developing countries, there is an intense competition amongst logistics firms to capture the significant share of the core customers in the transport market due to the large population size and globalization (Faajir and Zidan, 2016). Hence, competitive pressure can foster the decision of a logistics firm to imitate other firms in the logistics sector to implement supply chain social sustainability through the use of social media.

4.4. Ranking of the critical success factors within each dimension

Technological critical success factors: The findings of this study show that sufficient security and privacy has the highest rank in this dimension. Data security and privacy is a major concern to use social media for logistics supply chain social sustainability (Yadegaridehkordi et al, 2018). This implies that the managers and other actors in the logistics industry will be more disposed to use social media to achieve supply chain social sustainability if sufficient privacy and security is provided. The next ranked in this dimension is affordability. This factor is critical to achieve social sustainability

objectives and indicates that social media technologies can be effectively adopted in the logistics industry if they are deemed affordable. Perceived benefits of the use of social media have been shown to be crucial in this study to achieve social sustainability objectives. Positive perceptions of the benefits of social media can provide an incentive as a useful business strategy to adopt social media (Brock and Khan, 2017). Other critical factors which have been shown to be lower in influence are efficient technology and compatible technology facilities.

Organizational critical success factors: This primary critical factor within this dimension is positive attitude towards social media (Adnan et al, 2017; Kwoon et al, 2014). The next two factors in the organizational dimension are organizational culture and firm size and organizational structure. This indicates that the culture that is practiced in a logistics firm can be a catalyst to the use of social media for social sustainability objectives. Also, the size of a logistics firm can encourage the use of social media for sustainability purposes. Logistics firms of large size can obtain more resources to change business strategy which can influence the likelihood of their management to consider the use of social media for supply chain social sustainability (Lian et al, 2014). Also, a well-established organizational structure can be advantageous and provide propensity to adopting social media technologies in the logistics industry (Kuo and Smith, 2018).

Institutional critical success factor: This dimension has competitive pressure as the highest rank in this study. This critical factor is extremely important for the Nigerian logistics sector as this can encourage the use of social media to actualize social sustainability goals in the supply chain. Due to competitive pressure, the management of an organization will often imitate other firms' strategies to demonstrate its competence to its stakeholders or competitors (Verma et al, 2017). This is in accordance with institutional theory which states that an organization will emulate other similar organizations in their operational decisions to act (Nilashi et al, 2016). This is due to other organizations sharing a common economic network in the industry, in terms of their respective objectives, services and barriers. Government support and policies is ranked second and is one of the top critical success factors that foster the use of social media for supply chain sustainability in the logistics sector. Generally, logistics firms have limited control over the policies that are enacted by government regulatory agencies. Hence, the availability of relevant government policies and adequate support can be a boost to the decision of management in the logistics industry to use social media for supply chain social sustainability (Orji and Wei, 2018). This is because the government agencies as stakeholders can exert pressure on the organization to adopt new business practices.

Human critical success factors: The results of this study show that customer satisfaction is the highest ranked critical success factor in this dimension. This indicates that logistics services are driven by satisfying the values of customers and can play a key role in actualizing social sustainability objectives. Team commitment and top management support are highly ranked factors in this dimension. Team commitment and involvement can be defined as the extent to which an individual identifies with an organization and demonstrate willingness to pursue its goals to increase competitive

advantage (Sun et al, 2016). Logistics firms can benefit from the involvement and commitment of team to the use of social media for supply chain social sustainability. The top management usually drives the attention of employees and lead resources for innovation throughout its development and implementation thereby enhancing quality planning, leadership strategies and innovation management to improve firm performance (Nilashi et al, 2016). This implies that effective top management support and commitment is a major key to ensure that social sustainability objectives are achieved in the logistics industry of the Nigerian business environment. Other critical success factors in this dimension are proper communication among partners and employee competence.

4.5 Theoretical and practical implications

This study contributes to the theory and practice of actualizing social sustainability objectives through the use of social media, particularly in the logistics supply chains. From a theoretical standpoint, the critical success theory aids in understanding the limited areas in which if concentrated on, can achieve organizational objectives. This paper makes contribution to the critical success theory by stating the premise that the organizational use of social media is influenced by drivers which can cause significantly achieve supply chain social sustainability and increase competitive advantage. From the TOE and HOT theoretical perspectives, the use of social media for logistics supply chain social sustainability is influenced by the contexts of TOEH (Technology, Organization, Institution- external environment, Human). With the intense competition amongst firms due to customer pressures and government sustainable requirements, there is need to include the TOEH dimensions during investigating drivers of social media use and to analyze their relative importance for logistics supply chain social sustainability. Through the lens of the TOE and HOT theories, there is increase in the level of variance explained on the use of social media in the logistics industry to achieve supply chain social sustainability than for the traditional theories.

Based on the research findings of this work, it is suggested that customer satisfaction, sufficient security and privacy, affordability and competitive pressure can foster the use of social media in Nigerian logistics firms to achieve supply chain social sustainability. These research findings are in line with Nilashi et al (2016) regarding the huge influence of ‘customer satisfaction’ and ‘competitive pressure’ in the adoption of innovation to improve performance. In addition, Yadegaridehkordi et al (2018) also supports the important role that ‘sufficient security and privacy’ plays in facilitating the actualization of social sustainability goals. Our research complements literature (Kumar and Anbanandam (2019) that the logistics industry can contribute to achieve supply chain social sustainability objectives. Our work contradicts Adnan et al (2017) and Kwoon et al (2014) on the importance of ‘organizational culture’ during adopting social innovation for sustainability goals. Contrary to Elbaz and Haddoud (2017), our results indicate that ‘employee competence and training’ is not highly crucial to foster the use of social media for social sustainability purposes in the logistics sector. This is attributable to the fact that social media technologies are user friendly and less likely to be complicated thus does not necessitate technical expertise. Also, our work contracts

Shankar et al on the huge influence of efficient technology in the use of innovation for sustainability objectives. A plausible explanation might be that social media use do not require access to advance technologies.

Moreover, our research corroborates studies on the use of social media to achieve sustainability goals in the operations and supply chain management domain (Wang et al, 2019). However, our approach and context differ from past published works because we employed the critical success factor theory in the TOE and HOT theoretical frameworks to study factors which influence the use of social media for social sustainability in the Nigerian logistics sector. Hence, this study will encourage managers to emphasize the highly ranked critical success factors so as to achieve social sustainability and increase competitiveness. The developed research modeling framework in this research can be applied by any logistics firm to identify the highest ranked CSFs which can be effective during the use of social media for social sustainability.

4.6. Managerial implications

This work provides a comprehensive and in-depth understanding to managers in effective adoption of social media for sustainable social supply chain in freight logistics industry. The study is especially helpful for managers of freight logistics companies in developing countries like Nigeria and India, where managers have a comprehensive framework for social media adoption in sustainable social supply chains. The managers can adopt this framework and focus more on enhancing technologies and developing competencies among employees of freight logistic industry through training programs for better adoption of social media for sustainable social supply chain.

It is extremely difficult for a manager to focus and devote resources on all the dimensions simultaneously. Thus, ranking the various dimensions and sub dimensions using BWM can help managers to devote resources primarily on top ranked dimensions. Thus, as per the results obtained from current framework and study it is easier for managers in the case of use of social media for sustainable social supply chain in freight logistics companies to devote resources primarily on Human dimensions and more specifically on customer satisfaction followed by Technological dimensions that include privacy and security of the social media platform and customers to enhance social media use for sustainable social supply chain in freight logistics.

5 Conclusion

By drawing upon the TOE and HOT theoretical frameworks, this study increased the level of variance explained on the use of social media for freight logistics supply chain social sustainability. Thus, this study by applying the TOE and HOT generic theories of technology diffusion, proposed a comprehensive research framework that is relevant to the context of the Nigerian freight logistics industry to successfully adopt the social media innovation in its operations. This is believed will give a better understanding of the social media and address issues pertaining to its use as an outcome in the logistics level. Furthermore, the finding of this study indicates that the integration of social media in the Nigeria freight logistics sector is still in the early stage, which signifies the slow rate of using social media. Four major dimensions of technology, organization, human and institution (external environment) were highlighted to have

significant influence on the overall adoption decision of social media in the freight logistics sector. Thus, this study has shown the usefulness of the developed comprehensive framework for identifying the critical factors that influence organizational use of social media that compared to the traditional theories is a more reliable tool to categorize all the drivers of social media use in the freight logistics sector according to its four potential dimensions and to explain it.

Moreover, the Best- Worst Method was employed as an effective research modeling approach in existing literature to determine the relative importance of the critical factors for social media use to logistics supply chain social sustainability. The research findings of this research indicate that 'Customer satisfaction', 'Sufficient security and privacy', 'Affordability' and 'Competitive pressure' are estimated to be highly influential in using social media to achieve social sustainability in the freight logistics sector. This research will encourage policy makers and practitioners to gain perspectives on how to foster the use of social media in the freight logistics sector for supply chain social sustainability.

This study is based on the opinions of logistics managers in the Nigerian freight logistics industry which may be characterized with biased judgment and ambiguity. Fuzzy logic may be applied in future study to reduce uncertainty in experts' judgments (Orji and Wei, 2015). In future research, other industrial sectors e.g. manufacturing, construction etc. may be investigated by utilizing the research modeling framework developed in this study. In addition, the research modeling framework may be modified to employ other multi- criteria decision models such as TOPSIS, AHP and DEMATEL. Furthermore, a broader perspective of the current study may be carried out by collecting information from a larger pool of experts in the logistics sector of other countries. A comparative analysis of this study can be done by comparing different modeling frameworks on the subject theme or comparing results of logistics sectors of different countries or comparing results from different freight logistics firms in Nigeria.

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