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RESEARCH ARTICLE

A Best Worst Method-Based Approach to Social Sustainability: Insights from Moroccan Supply Chain

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ARTICLE INFO	ABSTRACT
	In today's global business environment, supply chain sustainability has become an increasingly important topic for practitioners and researchers alike. This is due to pressure from customers, regulations, environmental degradation, scarcity of resources and even investor expectations. Regarding sustainability in the supply chain, the literature is abundant in terms of studies carried out on the environmental and economic dimensions of sustainability. While the social dimension has been neglected in the past for a number of reasons, mainly due to a focus on short-term goals, a lack of clarity in application and measurement, and insufficient pressure from stakeholders but this should no longer be an excuse for companies or researchers when there are a number of social issues in the supply chain that need to be addressed. Consequently, in the first instance, this study is intended to shed light on the social problems that can exist in the supply chain, and in the second instance to propose practices or measures that can be put in place to limit and correct these problems by weighing up the importance of each of these social practices. To assess social sustainability practices, this study adopted the best-worst method (BWM). It's a multi-criteria decision-making approach (MCDM) developed to solve complex decision-making problems by comparing different criteria. The study examined six social practices that represent key elements for social sustainability: philanthropy, health and safety, code of conduct, human rights, fair trade and equity. These practices were evaluated using the best-worst method which gives weight to these criteria. Based on the results obtained, the 'health and safety' practice is the most important criterion compared with the other practices, followed by the 'human rights' practice. And as the least important practice, we had 'fair trade' with a low weight. This study is a basis for understanding and better applying social practices in the supply chain both in terms of theory and practice. This work has conducted a rich literature review to explore and detect social practices that are used to ensure sustainability in the supply chain. Empirically, the BWM method has enabled us to highlight the practices that companies should prioritize to ensure their sustainability.

INTRODUCTION

The growing focus on corporate responsibility has driven social sustainability to become a key issue in supply chain management (SCM). Moving beyond financial and operational performance, companies are increasingly assessed on their ability to address social issues such as workers' rights, health and safety, equity and ensuring the well-being of people. These issues are essential to the development of responsible and sustainable supply chains, but many companies continue to struggle with the question of how to effectively integrate and prioritize social sustainability practices. While

progress has been achieved in the environmental dimension of sustainability, the integration of the social sustainability dimension into SCM remains underdeveloped. For organizations seeking to meet these expectations, the lack of standardized frameworks and clear metrics for measuring social impact presents significant challenges [Mani et al., 2016]. Socially sustainable supply chain management refers to practices that improve the lives of workers and communities while maintaining business operations, however there is frequently a gap between the practical application of these concepts and their theoretical discourse [Köksal et al., 2017]. Research has shown that, while Corporate Social Responsibility practices in the logistics context are essential, companies face barriers such as diverse regulatory environments, cultural differences and inconsistent application of social standards, thus complicating the adoption of socially responsible practices [Croom et al., 2018].

To better understand and address these challenges, this paper aims to assess and rank social sustainability practices in industrial supply chains using the Best Worst Method (BWM). The BWM provides a systematic approach to ranking criteria by comparing the most and least important practices. This method has proven useful in supply chain contexts where multi-criteria decision-making is required [Mani et al., 2016]. In this study, key social sustainability practices such as health and safety, human rights, equity, philanthropy, and fair trade are evaluated for their relevance and impact on the overall performance of supply chains. This research contributes to the growing body of literature on socially sustainable supply chain management by offering a framework that helps firms prioritize social sustainability practices. It therefore provides empirical insights for organizations aiming to integrate social responsibility into their supply chains, reconciling the disparity between theoretical frameworks and practical implementation [Alghababsheh & Gallear, 2022; Klassen & Vereecke, 2012]. This paper is structured as follows: Section 2 presents a detailed literature review on social sustainability in supply chains, focusing on key challenges and the current state of research. Section 3 outlines the methodology, explaining the use of the Best Worst Method (BWM) and the process for selecting and ranking social sustainability criteria. Section 4 discusses the results of the analysis, offering insights into the most and least important social sustainability practices for industrial supply chains. Section 5 provides a discussion of the findings, their implications for both academia and industry, and potential avenues for future research. Finally, Section 6 concludes the paper by summarizing the main contributions and offering recommendations for practitioners aiming to enhance social sustainability within their supply chains.

LITERATURE REVIEW

Sustainability in the supply chain

Nowadays, companies are increasingly prioritizing sustainability in their strategic agenda [Wang & Dai, 2018]. This is due to strong pressure from customers, regulations, investor expectations and limitations in resources. In fact, these pressures have pushed companies to introduce and implement strategies that will guarantee their sustainability particularly within the supply chain. Supply chain management remains a major issue linked to the sustainability of companies. Sustainability is often described as a development that meets the needs of the present without compromising the ability of future generations to meet their needs. In supply chain management , sustainability is based on the concept of Triple Bottom Line by John Elkington [Mukatia et al., 2018]. The TBL approach focuses on three dimensions including economic, environmental and social. Therefore, integrating sustainability into supply chain management involves managing the flow of materials, information and capitals throughout the supply chain, taking into account the three pillars of sustainability [Seuring & Müller, 2008]. Indeed, this integration has led to the emergence of a new concept namely sustainable supply chain management (SSCM). SSCM covers environmental , social and economic aspects of the supply chain [Mukatia et al., 2018]. Although the concept of SSCM is relatively new, it has deep roots, as it has always been closely linked to green supply chain management. During that period, the concept was primarily viewed from an environmental aspect [Wang & Dai, 2018]. Thus, there is a great deal of research on green supply chain management. The environmental dimension of SSCM is about minimizing the negative impacts of supply chain activities on the environment [Varsei, 2016] and the economic dimension focus on ensuring the viability and profitability of the supply chain whilst protecting the well-being of society and the environment [Seklouli Sekhari et al., 2010]. Indeed,

previous research had focused on the environmental and economic issues more than the social aspects [Ahi & Searcy, 2013; Alghababsheh & Gallear, 2022; Esfahbodi et al., 2016].

Social sustainability of the supply chain

In the pursuit of sustainability, companies must consider the social dimension of supply chain sustainability in the same way as the other two dimensions namely economic and environmental [Khokhar et al., 2020]. Nowadays, social issues are becoming an increasing concern for companies, practitioners and even for academics. This is due to the fact that customers and stakeholders are increasingly inquiring not just about where products are made, but also about how and under what conditions they are produced [Mani et al., 2016]. And these social issues focus primarily on human health and societal well-being [Awan, 2019]. In the supply chain literature, social sustainability has been perceived in the past as corporate social responsibility (CSR) [Ciliberti et al., 2008]. For example, Mohr et al [2001] who presented CSR from a social perspective, defining it as a commitment made by a company to reduce its negative impacts on society while increasing the positive impacts on society. Despite the similarities and confusion between the two concepts, they will always remain different. In fact, CSR is a complicated concept that can be associated with various principles and values [Wirba, 2023]. From the literature, CSR is a broader concept that encompasses the company's responsibility to society. As components, CSR encompasses a whole range of social, environmental, ethical and even economic aspects. In contrast, social supply chain focuses on the social dimension of the supply chain where the main goal is to create socially responsible practices within the supply chain. This can be achieved by respecting humanitarian values and ethics when making decisions [Panigrahi et al., 2019]. The social supply chain focuses commonly on upholding justice and human rights as well as enhancing the well-being of employees .

 After a comprehensive review of the literature, we have aimed to identify the social challenges related to the supply chain namely child labor [Alghababsheh & Gallear, 2022; Nair & Thankamony, 2021; Sancha et al., 2016; Yawar & Seuring, 2017], working conditions [Köksal et al., 2017; Mani et al., 2016; Morais & Barbieri, 2022, 2022], human rights violation [Nair & Thankamony, 2021; Santiteerakul et al., 2011], gender inequality [Mani et al., 2016; Morais & Barbieri, 2022; Nair & Thankamony, 2021; Yawar & Seuring, 2017] , unfair trade and lack of transparency [Sajjad & Eweje, 2013], lack of health and safety standards [Kottala, 2021; Mani et al., 2016; Yawar & Seuring, 2017], etc. To address these social challenges, social supply chain management must be implemented, enabling the company to adopt responsible practices within the supply chain. In fact, this literature review highlighted that social sustainability measures have received limited attention so far.

Carter and Jennings [2002] explored the significance of having a social supply chain illustrating how integrating social practices as ethical behavior, diversity, philanthropy, human rights, safety can influence the entire supply chain leading it to enhance its sustainability. Seuring and Müller [2008] made a review on both environmental and social dimension of SSCM. They discussed the importance of the social sustainability which includes human rights compliance, fair wages, labor practices, health and safety standards for employees. Klassen and Vereecke [2012] conducted a study exploring how social responsibility can influence the management of supply chain risks, emphasizing the importance of integrating social practices as ethical policies, labor conditions, collaboration with stakeholders and community engagement. Mani et al. [2016] highlighted significant social issues with the most prominent concerns namely safety, philanthropy, ethics, health and welfare, human rights and equity. Another significant contribution to the literature was made by Yawar and Seuring [2017] in their research where they demonstrated how social strategies can lead to social and economic benefits . They proposed various strategies used to address social issues like code of conduct, fair labor practices, health and safety, human rights, collaboration with suppliers, trust, ethical trading and community engagement. Alghababsheh and Gallear [2022] made a comprehensive review on social sustainability in supply chains. The research outlined the adoption of certain social approaches like ensuring suppliers to adhere labor and safety standards, collaborating with stakeholders, providing educational opportunities, improving conditions for employees and gender equality. From this review, it appears that the literature struggles to achieve a consensus on social practices within the supply chain, likely due to the complexity and diversity of social issues, which vary across different regional, industry contexts and nature of the supply chain. Nevertheless, our study is built on the practices most frequently mentioned by the authors. Based on

this, the criteria we have selected are health and safety, equity, code of conduct, fair trade, philanthropy, and human rights.

Criterion$_1$: Health and safety (HS) focus on ensuring the well-being of all the employees within the organization. It addresses safe working conditions, avoiding forced labor, preventing accidents and promoting a healthy work environment [Shekarian et al., 2022].

Criterion$_2$: Equity (EQT) refers to the fair treatment of all the stakeholders by ensuring the adoption of fair and ethical practices throughout the supply chain[Fernando et al., 2022]. It involves homogeneity, fair employment and equitable incomes [Panigrahi et al., 2019].

Criterion$_3$: Human rights (HR) is about respecting human rights regardless of gender, religion, race, nationality or any other status [Panigrahi et al., 2019].

Criterion$_4$: Fair trade (FT) is about creating a balanced trade relationships that are based on fairness, transparency and anti-corruption policies[Shekarian et al., 2022].

Criterion$_5$: The Code of Conduct (CC) describes a set of guidelines and rules that should be adopted. It includes moral principles, social responsibilities and ethical codes [Panigrahi et al., 2019].

Criterion$_6$: Philanthropy (PHL) is about contributing to the good and giving back to society through acts of generosity, charitable giving and voluntarism [Fernando et al., 2022].

METHODOLOGY

The Best Worst Method (BWM) offers a streamlined approach to decision-making by reducing the number of pairwise comparisons required, compared to conventional methods like the Analytic Hierarchy Process (AHP), thus enhancing the overall efficiency of the process [Haseli et al., 2024]. This reduction not only simplifies the decision-making procedure but also contributes to improved consistency in the prioritization of criteria, thereby increasing its applicability and reliability in practical settings [Varchandi et al., 2024]. Furthermore, BWM's robust mathematical framework supports the derivation of unique solutions in complex scenarios, providing a systematic and rigorous approach to multi-criteria decision analysis. This analytical foundation enables the identification of optimal solutions when dealing with diverse sustainability criteria [Wu et al., 2024]. This method allows decision-makers to prioritize various sustainability factors by identifying the most and least important criteria, thus facilitating a structured approach to supplier selection and performance assessment. The paper by Ahmadi et al. [2017] focuses on using the Best Worst Method (BWM) to assess and prioritize social sustainability criteria within supply chains. It highlights how BWM can structure the evaluation process by identifying critical social sustainability factors and consulting experts to rank these factors [Ahmadi et al., 2017]. Similarly, Alidoosti et al. [2020] have applied BWM to assess the social sustainability of various treatment technologies for bioenergy generation from municipal solid waste. This study provides insights into which technologies best meet social sustainability goals, thus guiding stakeholders in technology selection [Alidoosti et al., 2020]. Meanwhile, Munny et al. [2019] have explored the enablers of social sustainability within the footwear industry in an emerging economy. By identifying key factors and prioritizing them through qualitative analysis and BWM, the research offers practical recommendations for improving social performance in this specific industry [Munny et al., 2019]. Lastly, Khokhar et al. [2020] have evaluated social sustainability criteria in manufacturing industries using BWM. This paper demonstrates the method's effectiveness in ranking and prioritizing sustainability criteria, offering a framework that manufacturing companies can use to enhance their social sustainability practices [Khokhar et al., 2020]. Together, these studies illustrate the diverse application of BWM in assessing and improving social sustainability across various contexts and industries. The objective of this study is to evaluate and prioritize social sustainability criteria within the supply chain using the Best Worst Method (BWM). This method was selected for its ability to handle multiple criteria efficiently and minimize inconsistency in prioritization.

Steps in Best Worst Method

Identification of decision criteria:

The first step is to identify the criteria to be assessed and ranked. Considering that $C=\{C1, C2, ..., Cn\}$ represent the set of criteria/practices. In the context of social practices for supply chain sustainability, the practices that we have chosen for this study are Health and Safety *(C1)*, Equity *(C2)*, Human Rights *(C3)*, Fair Trade *(C4)*, Code of Conduct *(C5)*, and Philanthropy *(C6)*.

Best and worst criteria selection:

In this step, we asked the participants, "Which of the social practices is the most important for supply chain sustainability?" and "Which of the social practices is the least important for supply chain sustainability?". Then, each participant selects one criterion as the "best" C_b and one as the "worst" C_w based on their judgment. For instance, if "Code of conduct" (C_5) is chosen as the best and "Equity" (C_2) as the worst, these will serve as reference points for the comparisons.

Pairwise comparisons:

- The best practice over all other practices: each social practice is compared to the best criterion. The participants assign a value ab,i on a scale from 1 to 9: 1=equal importance; 3=Moderately more important; 5=Strongly more important; 7=Very strongly more important; 9=Extremely more important; 2, 4, 6, 8 = Intermediate values.

This represents how much more important the best criterion C_b is compared to each criterion C_i. For instance, $a_{b,i} = 1$ if C_b is equally important as C_i. And $a_{b,i} = 9$ if C_b is extremely more important than C_i.

We can express the best to others vector as:

$$A_B = (a_{b,1}, a_{b,2} ..., a_{b,n})$$

where $a_{b,i}$ signifies the importance of the best criterion B over the criterion i.

- Others-to-worst comparisons: similarly, we asked the participants to compare each criterion to the worst criterion. The participants assign a value $a_{i,w}$, representing how much more important C_i is compared to the worst criterion C_w. For instance, $a_{i,w} = 1$ if C_i is equally important as C_w. And $a_{i,w} = 9$ if C_i is extremely more important than C_w.

We can express others to worst vector as:

$$A_w = (a_{,1w}, a_{2,w} ..., a_{n,w})$$

where $a_{i,w}$ signifies the importance of the criterion i over the worst criterion W.

Optimization model:

The objective of the optimization problem is to determine the weights $w_1, w_2, ..., w_n$ of the criteria such that the maximum absolute deviation between the pairwise comparisons and the derived weights is minimized. The following optimization model is formulated [Liang et al., 2020]:

$$\text{Min}\left[max_i\left(\left|w_b - a_{b,i}w_i\right|, \left|w_i - a_{i,w}w_w\right|\right)\right] \quad (1)$$

$$\text{s.t.} \sum_i w_i = 1$$

$$w_i \geq 0, \text{for all } i$$

Also, to solve Equation (1) a linear optimization model is needed, and it can be expressed as follow:

$$min^{\delta^L}$$

$$s.t.$$

$$\left|w_b - a_{b,i}w_i\right| \leq \delta^L, \text{for all } i$$

$$\left| w_i - a_{i,w} w_w \right| \leq \delta^L, \text{ for all } i$$

$$\sum_i w_i = 1$$

$w_i \geq 0$, for all i

Here, δ^L is the maximum deviation between the pairwise comparison values and the ratio of the weights, and the goal is to minimize this deviation.

Solving the model:

The optimization problem is solved using linear programming version of BWM Excel solver [Ait Hammou et al., 2023]. The output provides the optimal weights $w_1, w_2, ..., w_n$, indicating the relative importance of each criterion. A lower value of δ^L indicates a more consistent set of judgments from the participant.

DATA COLLECTION AND ANALYSIS

In this study, data collection began by targeting potential respondents selected through purposive sampling, focusing on individuals with relevant expertise in social practices and supply chain management. Prior to survey distribution, a pilot test was conducted with four experts, whose feedback was used to assess question clarity and ensure compliance with research ethics. These pilot responses were excluded from the final analysis. The finalized survey was then sent to 40 supply chain management experts in Morocco: 25 through email and 15 via ResearchGate. Data was gathered between June and September 2024, resulting in 25 total responses. However, only 19 were included in the analysis, as six responses were eliminated due to straight lining. The participants were industry experts from diverse sectors in Morocco. Hebaz et al. [2022] note that data saturation in most MCDM studies is typically achieved with 4 to 10 respondents, which supports the reliability of our study's results. Furthermore, to ensure robustness, the average δ^L in this study was calculated at 0.103 (Table 1), significantly below the threshold of 0.3924 for studies involving six criteria, as recommended by [Liang et al., 2020].

Table 1 Optimal weights and average consistency ratio

Respondent	HS	EQT	HR	FT	CC	PHL	δ
1	0.514433	0.102887	0.120034	0.080023	0.144041	0.038582	0.205773
2	0.337917	0.196464	0.306483	0.031434	0.078585	0.049116	0.055009
3	0.288485	0.135758	0.407273	0.067879	0.042424	0.058182	0.118787
4	0.364162	0.150289	0.225434	0.034682	0.150289	0.075145	0.086705
5	0.265072	0.076731	0.338316	0.054808	0.240658	0.024415	0.118584
6	0.268482	0.233463	0.326848	0.054475	0.081712	0.035019	0.058365
7	0.408759	0.187348	0.187348	0.042579	0.093674	0.080292	0.153284
8	0.336239	0.211706	0.211706	0.084682	0.049813	0.105853	0.087173
9	0.229592	0.229592	0.336735	0.076531	0.091837	0.035714	0.122448
10	0.228013	0.325733	0.228013	0.065147	0.039088	0.114007	0.130293
11	0.366386	0.235534	0.157022	0.117767	0.094213	0.029078	0.104681
12	0.333621	0.193966	0.333621	0.043103	0.064655	0.031034	0.054310
13	0.275510	0.244898	0.306122	0.061224	0.076531	0.035714	0.030612
14	0.344595	0.243243	0.162162	0.054054	0.162162	0.033784	0.141891
15	0.339746	0.211194	0.211194	0.060341	0.140796	0.036729	0.082641
16	0.182467	0.136850	0.398651	0.035700	0.136850	0.109480	0.148750
17	0.262055	0.293501	0.262055	0.031447	0.083857	0.067086	0.073375
18	0.340909	0.227273	0.227273	0.037879	0.090909	0.075758	0.113636
19	0.216495	0.216495	0.355670	0.030928	0.108247	0.072165	0.077319
Mean	0.311	0.203	0.269	0.056	0.104	0.058	0.103
Rank	**1**	**3**	**2**	**6**	**4**	**5**	

RESULTS AND DISCUSSION

Based on the results outlined above "health and safety" has the highest criterion weight of 0.311. This demonstrates that social sustainability cannot be achieved without implementing strategies that prioritize the health and safety of workers. Indeed, workers tend to develop a strong connection with an organization that prioritizes their working conditions as well as their health [Das, 2018]. By prioritizing health and safety, companies can protect their employees from harm while creating a more human work environment which is fundamental to social sustainability [Fan et al., 2021]. According to Yawar and Seuring, [2017], working conditions are a key focus in the context of supply chain sustainability, playing a vital role in foresting employee loyalty and a positive reputation of stakeholders. This is followed by "Human rights" with criterion weight of 0.269. Upholding human rights helps in preventing exploitation and child labor. Based on the literature review, these elements signify the primary challenges facing the social supply chain. And by respecting human rights, companies can create a supportive environment for their business. Taking employees' rights into account when making decisions can help to improve and secure workers' rights by avoiding any problems that may impact on the company [Nair & Thankamony, 2021]. The existing literature focuses mainly on human rights, employment issues and working conditions, which could be explained by the fact that these concerns have the potential to cause more impact on human well-being compared to other social issues within the supply chain [Alghababsheh & Gallear, 2022]. As a third key criterion in social supply chain , "Equity" follows human rights and this is in line with the idea of Lieder and Rashid, [2015] which confirms that social sustainability prioritizes firstly health and safety of employees, the improvement of social conditions and then the requirements of equity. Companies seek more to establish policies of equality, inclusion, diversity and non-discrimination between the sexes with all stakeholders [Mani et al., 2016]. Equity is a theory that includes fairness and justice which are vital elements that must be addressed by companies in order to achieve the long term sustainability [Zhou et al., 2020]. Then we had "code of conduct" as a fourth important criterion. This outcome is somewhat disappointing, considering that the code of conduct serves as a fundamental reference for establishing ethical standards within companies. Codes of conduct is the most widely used safeguard against social issues enhancing social performance [Yawar & Seuring, 2017]. In addition to that, codes of conduct are among the earliest established practices in social supply chain [Alghababsheh & Gallear, 2022]. "Philanthropy" ranks fifth before the least important practice. The result does not emphasize this practice despite its importance and the benefits it can bring to the company. This may be attributed to the fact that philanthropic activities typically demand financial resources [Alghababsheh & Gallear, 2022]. The results indicate that "Fair trade" is regarded as the least important criterion among all these practices. Fair trade has been considered as an important element when it comes to making the supply chain more sustainable [Auroi, 2003]. It's a trading partnership based on shared values of commitment, transparency and responsibility between buyers and sellers leading to sustainable development [Le Mare, 2008]. Despite this, the results show that this criterion is not much appreciated by respondents. The goal of fair trade is to ensure fair wages and fair prices. In the case of our study, this work was carried out in a country where labor costs are much lower. This encourages companies to take advantage of this and pay unfair wages. Fair trade is seen as the least important criterion, which can discourage companies from adopting fair pay practices, as the benefits are not always directly visible [Fiedoruk, 2022]. In relation to the second point about fair pricing, companies may exploit the absence of regulatory frameworks surrounding pricing practices, which allows them to impose unfair prices on consumers or suppliers.

CONCLUSION

This study assessed social sustainability practices within supply chains using the Best Worst Method (BWM). The analysis revealed "Health and Safety" as the most critical social sustainability practice, highlighting its importance in the protection of workers' well-being and respect for safety standards. In contrast, "Fair Trade" was found to be the least prioritized practice, indicating that, while fair trade principles are valued, they may not be implemented as rigorously within supply chains. This study contributes to the growing body of literature on social sustainability by offering a comprehensive evaluation framework using BWM. The application of this method provides a structured decision-making process that allows for prioritizing sustainability practices based on expert opinions. For moroccan supply chain practitioners, the results provide valuable guidelines on areas where to focus

efforts to improve social sustainability. Emphasizing "Health and Safety" meets global expectations for responsible supply chain management and promotes a safer working environment. Practitioners can also use these findings to reassess and strengthen "Fair trade" initiatives, ensuring that their supply chains follow fair and ethical trading standards. Overall, the study provides a clear hierarchy of priorities, guiding supply chain managers toward more socially responsible operations. Despite the insightful contributions, this study has several limitations. First, the sample size and geographical scope may limit the generalizability of the findings, as social sustainability priorities can vary across different industries and regions. Second, the study relies on expert judgments, which, while valuable, could introduce bias or reflect subjective preferences. Future research should consider larger and more diverse samples to validate the prioritization of social sustainability practices.

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