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Research article

Enablers of social sustainability in the supply chain: An example of footwear industry from an emerging economy

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ABSTRACT

Supply chain sustainability includes environmental, economic, and social dimensions. However, social sustainability in supply chains has received less attention than environmental and economic dimensions. Sustainability issues in emerging economies have also been neglected. Literature reviews reveal that assessing social sustainability in the context of the footwear supply chain in an emerging economy is still an under-researched area. Therefore, this study investigates enablers of social sustainability in the footwear supply chains in Bangladesh using the Best-Worst method. The framework was applied to a footwear manufacturing company with an aim to incorporate social sustainability practices into operations and supply chains. Nineteen enablers were identified by reviewing the extant literature. Among them, ten enablers were selected with the help of expert inputs. The enablers were ranked according to average weight evaluated by the Best-Worst method. The results indicated that workplace health and safety practices was the most important enabler to the social sustainability of a footwear manufacturing company's supply chain, followed by the wages and benefits offered to the employees of the company. The findings of this study are expected to guide industrial managers and experts on where to focus attention on achieving social sustainability in supply chains.

1. Introduction

A supply chain is an integral part of an organization. It is composed of downstream and upstream linkages of the diverse procedures and activities that create value in the form of products and services distributed to the ultimate consumers (Barbosa-Póvoa, 2014; Christopher, 2016). Supply chain management (SCM) is concerned with the total flow of materials and information from suppliers to customers (Jones and Riley, 1985; Munasinghe et al., 2019). To ensure sustainable development of the manufacturing industry, SCM plays a vital role (Ala-Harja and Helo, 2016; Pereseina et al., 2014). Supply chain activities ensure rapid growth of industrialization and maximized profits. However, human life and the natural environment are impacted by energy wastage and pollution, due to unplanned industrialization. Therefore, organizations should be working collectively to design and implement sustainable supply chain management (SSCM) (Barbosa-Póvoa et al., 2018; Fabbe-Costes et al., 2014), which ensures social, economic and environmental sustainability (Mangla et al., 2014).

The triple bottom line (TBL) is a popular concept in the academic study of supply chains. TBL is the integration of the three dimensions (i.e. social, environmental and economic) in a sustainable supply chain (Burki et al., 2018; Elkington, 1998). All three dimensions are crucial to developing a sustainable environment (Gimenez et al., 2012; Govindan et al., 2013).

Few previous studies have focused on the issues of supply chain social sustainability (SCSS) (Khan et al., 2018; Mani et al., 2016a,b; Seuring and Müller, 2008). Social sustainability is a moral rule of conduct for human longevity. SCSS should be carefully considered in a comprehensive, connected and reasonable manner (Esfahbodi et al., 2016; Sharma and Ruud, 2003). The human development index of industrialized and developing countries was sporadically assessed, and is the benchmark for social sustainability measures, established by the United Nations (Mani et al., 2014). This index encourages industrial managers to strengthen the social progress in sustainable development (Matos and Silvestre, 2013). It is difficult for developing countries to develop a sustainable business model for analyzing the most influential enablers to achieving social sustainability in supply

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chains (Mani et al., 2015). There are many possible enablers for social sustainability, and a framework for assessing these enablers is essential.

Supply chain sustainability may depend on individual companies or multiple-partner companies, including manufacturers and suppliers (Zhang et al., 2018; Ashby et al., 2012). Many western buyers from Italy, Germany, France, Japan, UK, USA, UAE, Spain etc. sourcing footwear from developing countries, like Bangladesh, are under pressure to ensure social sustainability practices in the supply chain (Klassen and Vereecke, 2012). Many stakeholders anticipate that buyers must confirm the social sustainability of individual processes as well as supply chain agents situated in developing countries.

The footwear industry of Bangladesh has emerged as the second-largest source of foreign currency of the country. In the fiscal year 2017–2018, this industry managed to earn 483 Million USD in export revenue making Bangladesh the sixth-largest footwear and leather goods exporter in the world (Star Business Report, 2018). The government of Bangladesh has targeted revenue of 5 billion USD by 2021 from the leather industry. Cheap labor and availability of raw materials have allowed Bangladesh to produce leather products at a lower price than its competitors and thus make an attractive destination for outsourcing to developed countries (Moktadir et al., 2018a,b, 2017; Paul et al., 2013). Bangladesh currently exports leather footwear, processed leather, and leather goods to many countries such as USA, UK, UAE, Japan, and Spain. Annually 310 million square feet of leather are produced each year in Bangladesh. Many top footwear brands such as Timberland, Wal-Mart, Bata, Nike etc. outsource from Bangladesh. Unfortunately, a plethora of social sustainability issues is present in the leather footwear industry. Problems like insufficient wages, poor working conditions, long working hours, absence of fire safety and do not exist hazard prevention regulation, gender inequality, child labor, poverty and health conditions are common in the footwear sector. These problems are making the footwear industry of Bangladesh unattractive to socially responsible buyers and thus are a major hindrance to the growth of the industry. In this context, it is vital for the footwear sector of Bangladesh to adopt SCSS practices into the traditional supply chain.

Most of the previous studies on sustainable supply chain have focused on environmental and economic sustainability. Choi and Ng (2011) showed the environmental and economic dimensions of sustainability and price effects on consumer responses. The challenges and conflicts in sustainable supply chain management in the context of the heavy vehicle industry were presented by Pereseina et al. (2014). Zokaeï and Manikas (2014) demonstrated the environmental sustainability of supply chains in the context of the biofuels industry in the United Kingdom. The environmental sustainability practices across upstream supply chain management were analyzed by Pimenta and Ball (2015). Ala-Harja and Helo (2016) investigated food supply chain sustainable performance in plant decision making. Emamisaleh and Rahmani (2017) researched on sustainability in food industries and showed the drivers and strategies toward sustainability achievement. A case study for sustainable supply chains management at IKEA was demonstrated by Laurin and Fantazy (2017). Mokhtar et al. (2017) showed the environmental sustainability of supply chains. The impact of corporate social sustainability culture on financial success is presented by Schönborn et al. (2019).

Social responsibility in the supply chain was less emphasized than the other dimensions of sustainable supply chains (Beske, 2012; Pagell and Wu, 2009; Esfahbodi et al., 2016; Wu and Pagell, 2011). The extant literature reveals that a number of studies have been conducted on social sustainability in supply chains. Although the studies focused on different industries, to the authors' knowledge, the footwear industry has not yet been investigated. Thus the contribution of the paper is that it identifies and assesses the most influential enablers to supply chain social sustainability (SCSS) management that are unique to footwear industries in developing countries such as Bangladesh. This paper not only identifies the most important enablers from literature and expert opinion it also ranks them in order of significance using Best-Worst method (BWM). A real-life case study was also undertaken to test the applicability of the framework. The specific objectives of this research are as follows:

- To identify enablers to social sustainability in footwear supply chains in Bangladesh.
- To apply the BWM framework to a real footwear supply chain.
- To rank the enablers of SCSS to help decision-makers emphasize the most important ones.

The Best-Worst method, proposed by Rezaei (2015, 2016), is a vector-based multi-criteria decision-making method. It is used to assess a set of alternatives with regard to a set of decision criteria. It was derived from a systematic pairwise comparison of the decision criteria. Compared to other multi-criteria decision-making (MCDM) methods, BWM offers two major advantages: (i) BWM requires the least pairwise comparison data, and (ii) the results of BWM are more reliable.

The rest of the paper is organized as follows. Section 2 gives the literature review of SSCM, social sustainability practices in the supply chain and enablers to a socially sustainable supply chain. Section 3 presents the theoretical framework for the method. Section 4 presents a real application of a footwear manufacturing company in Bangladesh used to represent enablers to supply chain social sustainability. Results and discussions are also presented in Section 4, and conclusions are drawn in Section 5.

2. Literature review

In this section, the previous studies on the social sustainability practices in supply chains and enablers to supply chain social sustainability are discussed.

2.1. Sustainable supply chain management (SSCM)

Sustainable supply chain management originated at the late 1980s when the World Commission on Environment and Development (WCED) introduced sustainable development as a concept. WCED (1987) defined sustainable development as the growth that meets the desires of the present without hampering the needs of future generations. Sustainable development is composed of three dimensions, namely social, economic and environmental. SSCM can be described as the supervision of the supply chain actions, operations, information and resources with the aim of maximizing the prosperity of the supply chain and social welfare, while simultaneously reducing harmful environmental effects (Shi et al., 2017; Hassini et al., 2012). SSCM concentrates on protecting the environment while refining socio-economic aspects for sustainable development.

The sustainable supply chain of the footwear industry of Bangladesh includes many active stakeholders. The stakeholders play an important role in making the whole supply chain sustainable. Essentially, there are two kinds of stakeholders such as internal and external stakeholders (Kleindorfer et al., 2005). The internal stakeholders remain in the organizations and the external stakeholders come from outside of the organizations (Ahmadi et al., 2017). The internal stakeholders of the sustainable supply chain of the footwear industry of Bangladesh include the board of directors of the company, managing director, chief executive officer (CEO), chief financial officer (CFO), chief technological

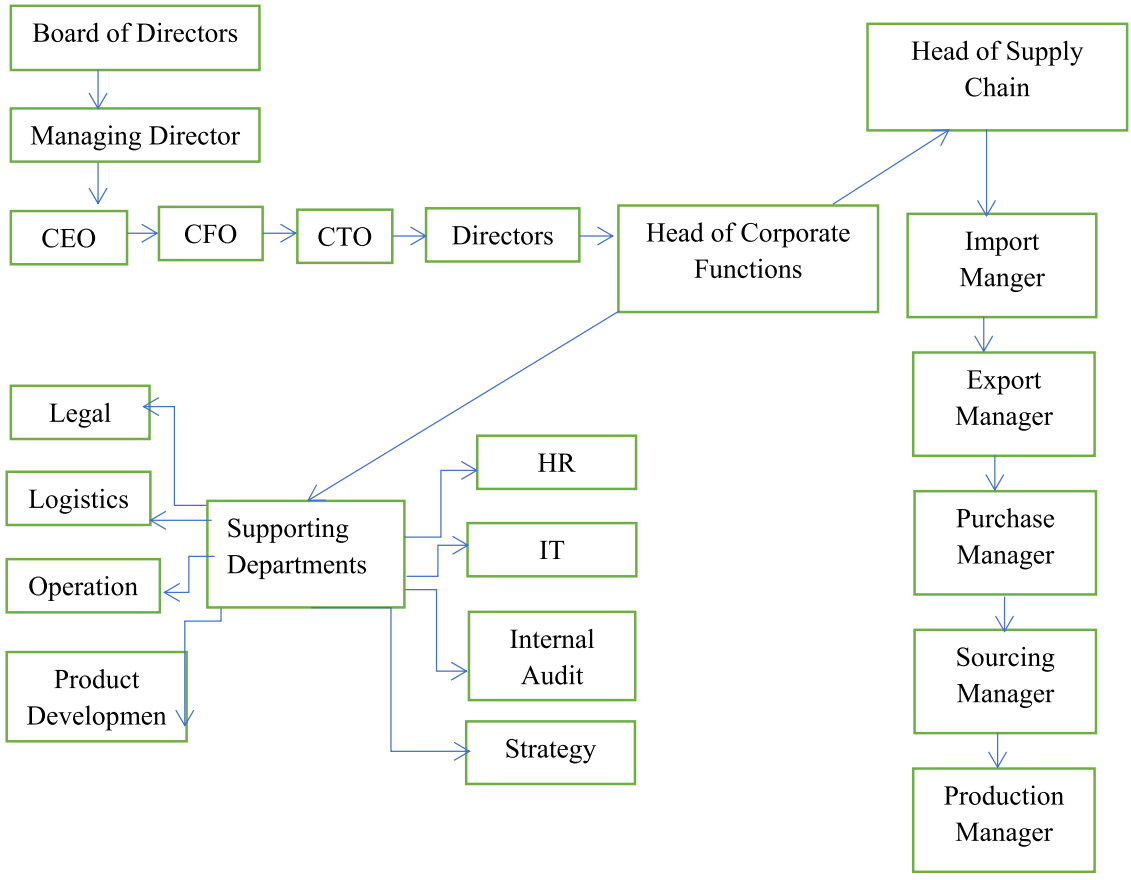

Fig. 1. Internal stakeholders in the footwear supply chains.

officer (CTO), head of corporate functions with the supporting bodies, head of supply chain with the supporting bodies, all executives and workers of the production unit (Moktadir et al., 2017). The diagram of the internal stakeholders in the footwear supply chains is depicted in Fig. 1.

The other important part of the stakeholders of the sustainable supply chain of the footwear industry of Bangladesh is external stakeholders. Major parts of external stakeholders belong to foreign buyers and local buyers. When external factors such as buyers are considered as important stakeholders of the industry, then some operational problems may arise. The buyers sometimes want to take advantage of this opportunity (Badri Ahmadi et al., 2017). They demand a lower price to sellers in our country. Therefore, managing the internal and external stakeholders of the footwear industry are a big challenge for sustainability in the supply chain for the growth of the business.

Due to the rapid growth of the human population and industrialization, natural resources are being destroyed by the pollution of air, water, and soil (Hoque and Clarke, 2013); these social issues are neglected much by industries. Therefore, a sustainable supply chain framework is essential.

According to Gimenez et al. (2012), the objectives of sustainability can be linked to three performance levels, which are described below. The supply chain partners attempt to maximize these three performance levels:

- Profit (Economic): This dimension indicates economic and financial sustainability.
- Planet (Environmental): This dimension refers to the performance related to environmental safety as well as general impact on the environment.
- People (Social): This dimension refers social interactions with the business environment.

SSCM can be achieved in traditional supply chain management by considering all the three dimensions of sustainability. Implementation of cleaner technologies and eco-friendly production can play a significant role in the sustainable development of the footwear sector of Bangladesh. However, implementation of SSCM practices is not an easy task. This study emphasizes the social dimensions of sustainability and develops an SCSS framework by identifying and assessing the most influential enablers relevant to the footwear industry of Bangladesh.

SSCM practices are becoming a priority all over the world, due to government regulation, customer expectation and buyer specification (Linton et al., 2007). The SSCM is gaining popularity in industry and academia (Sarkis et al., 2011). SSCM is the combination of many issues, including supply chain risk mitigation, greening the supply chain, product safety, environmental protection and adherence to compliance. The target of a sustainable supply chain is to reduce energy consumption from operations, increase renewable energy usage, reduce water consumption, decrease hazardous waste generation and reduce the environmental effects of manufacturing (Rauer and Kaufmann, 2015). Considering the importance of sustainability in the modern business ecosystem, industrial managers should give top priority to establishing socially responsible supply chains.

2.2. Social sustainability practices in supply chains

Social sustainability is an element of the TBL (Kleindorfer et al., 2005), which deals with the supervision of social capital and human beings, and consists of civil rights (e.g. worker rights along

with freedom of association), health and safety issues (e.g. safe working environment and education) and community (e.g. philanthropic initiatives) (Cooper et al., 2018). The sustainability outline, developed by Carroll (1979), described four responsibilities of the corporation, including legal, economic, ethical, and charitable or optional responsibilities. Sethi (1975) explained the social commitments and tasks of a corporation. Researchers have defined social sustainability from different angles. Some have joined social sustainability with the supervision of social resources, such as abilities and skills, social values and relationships (Mani et al., 2016a,b; Sarkis et al., 2010).

Social sustainability in the supply chain is the procedure by which social health and safety issues are addressed and improved. It is also the establishment of best management practices to the communities, labor and regions in the supply chain (Elkington, 2018; Montabon et al., 2016; Sloan, 2010). In a manufacturing supply chain, social sustainability is of prime consideration for the stakeholders' consciousness about how and in what environment the products are manufactured (McCarthy et al., 2010). The attention to social sustainability in the supply chain has increased, due to increased concerns of health and safety, child and forced labor, living conditions, housing with equity problems, etc. It also focuses on gender discrimination, wages, diversity and education, which may differ from country to country. However, to achieve social sustainability upstream of a supply chain, social issues must be concentrated on the supplier's locations (Mani et al., 2014). Buying with consideration of social aspects can help to achieve sustainability and effectiveness in the downstream supply chain (Martínez-Jurado and Moyano-Fuentes, 2014).

Different measures of SCSS appeared in the literature, which varied from country to country. Determination of global and local social sustainability indicators and dimensions was challenging, especially for manufacturing and operations sectors of developing countries. A few studies have investigated social sustainability management practices in the context of the manufacturing industry of Bangladesh.

Bai and Sarkis (2010) classified social sustainability enablers into external and internal categories. Internal social sustainability enablers included employment practices, health and safety factors, and external social sustainability enablers included influence of contractual stakeholders, local communities and other stakeholders. For a socially responsible supply chain, Amindoust et al. (2012) pointed out that organizations should take health and safety measures into consideration for employees. Govindan et al. (2013) used health and safety measures, employment practices and the power of local community and contractual stakeholders as social sustainability enablers. Azadnia et al. (2015) investigated aspects, such as education and training, occupational health and safety and community development as social sustainability enablers.

Ahmadi et al. (2017) considered health and safety issues and the influence of contractual stakeholders as social sustainability enablers. After reviewing the literature, a framework of social sustainability was found to be essential to help the manufacturing industries of Bangladesh achieve supply chain excellence. This study proposes a framework to identify and assess the most relevant social sustainability criteria for a footwear manufacturing company in Bangladesh.

2.3. Enablers to supply chain social sustainability

The literature presents a number of fundamental enablers to social sustainability in supply chains. The importance and priority of enablers may vary from industry to industry and may influence several stakeholders connected to a specific industry or a specific supply chain. Before filtering and finalizing the enablers to social sustainability in a socio-economic and industry context, a review of the literature was conducted to identify common enablers. During the literature review, the following points are taken into consideration for identification of enablers for supply chain social sustainability:

(1) In this research, the following keywords like 'social sustainability driver/enablers/motivator/element', 'social sustainability', 'sustainable supply chain AND enabler' are used to search in scholarly databases.
(2) The following scholarly databases: Web of Science and Scopus are selected and used. From those databases, we collected the articles written in English, peer-reviewed and relevant to the current research theme.
(3) Finally, from the selected peer-reviewed articles, the most important 19 enablers of social sustainability are selected and finalized for footwear supply chains in the context of an emerging economy.

Several studies like Ahmadi et al. (2017), Jilcha and Kitaw (2017) and Amindoust et al. (2012) highlighted the importance of workplace health and safety for achieving social sustainability. This criterion focuses on both the firm's and the supplier's operational health and safety practices, which involve the evaluation and reduction of risks that may affect the safety, health or welfare of those in the workplace. It may include the health and safety of the employees, customers, contractors, suppliers, visitors, and volunteers. The business owners must comply with legal requirements to ensure health and safety practices for the workplace. Customer requirements are an important social sustainability enabler (Mani et al., 2015; Chowdhury et al., 2019; Gong et al., 2019). Motivated by customer requirements, manufacturers will create long-term social sustainability initiatives. To this end, the necessity of developing socially responsible suppliers is gaining popularity among industrial practitioners.

According to Kausar et al. (2017), wages and benefits are one of the most important considerations for social sustainability. Nayak et al. (2019) conducted a study on the sustainability trends of the fashion supply chain of Vietnam and found wages and benefits to workers to be one of the most significant factors of the sustainable supply chain. The study was done by Mair et al. (2019) also supports this argument. Wages and benefits relate to proper payment and related sustainable employment issues. It is mainly to protect *employees*, and to make sure that the employees are treated equally in terms of payment. Emergency preparedness relates to the safety measures taken before, during and after an emergency situation (Presutti, 2003). Planning for an emergency is important for responding to natural and man-made accidents. For example, in the case of explosions, fires, chemical and biological attacks, emergency preparedness is necessary.

Food, housing, and sanitation concern the welfare of employees by providing healthy food, sanitation and housing (Mani et al., 2015). Employees should have the right to decide whether or not to engage in work, and not be forced, bonded or involuntary prisoned in any organization. An organization should provide workers with the freedom to leave the employer with reasonable notice (Presutti, 2003). This criterion refers to the prohibition of work that is physically, mentally, socially or morally hazardous and dangerous to children. Child labor or forced labor should be prohibited in organizations seeking social sustainability in supply chains (Zutshi et al., 2009; Xu et al., 2019; Nayak et al., 2019).

Commitment from top management is essential to the success of initiatives and actions toward social sustainability throughout the entire procurement process. Top management support ensures that necessary steps are taken and resources are allocated to implement supply chain social sustainability (Tobescu and Seuring, 2015; Maletic et al., 2011; Muchaendepi et al., 2019).

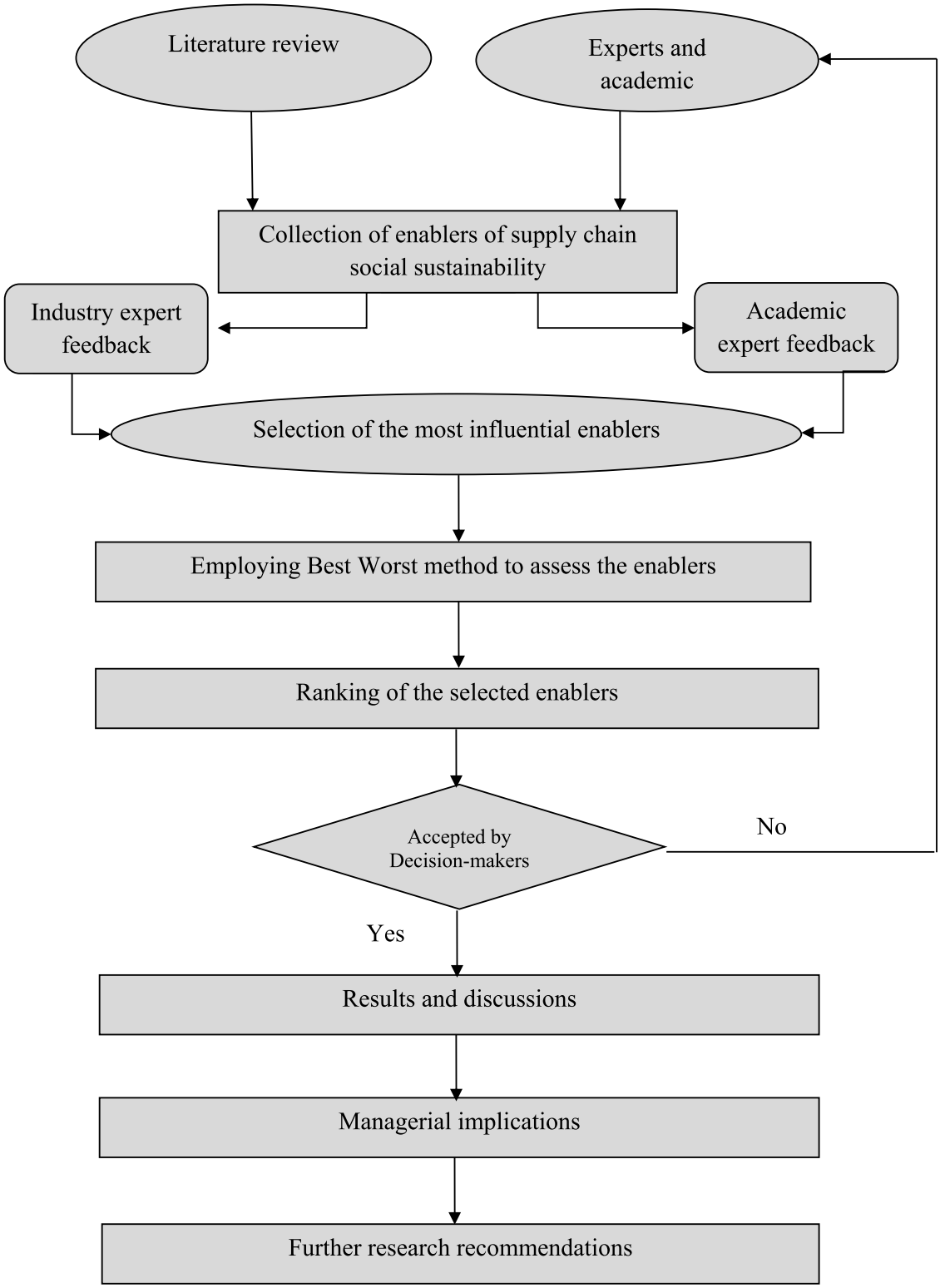

Fig. 2. Graphical flow of the study.

This criterion focuses on sharing or transferring knowledge from employers to employees on workplace safety, job safety and ethical business practices in the workplace. Appropriate training can help employees become aware of the importance of social sustainability (Harland, 1996; Badri Ahmadi et al., 2017; Azadnia et al., 2015).

Non-discrimination relates to established human rights without discrimination based on race, language, gender, religion, national or social origin, property, birth or other status such as age, disability, marital and family status. Human rights should be exercised without discrimination of any kind in the workplace (Blome et al., 2013; Azapagic and Perdan, 2000). *Anti-corruption* is anything that opposes or inhibits corruption. This criterion ensures a workplace free from illegal activities (Attaran,

Table 1
Comparison with the International Labor Organization Conventions & Recommendations with identified enablers.
Source: https://www.ilo.org/global/lang--en/index.htm.

Name of enablers	Comparison with the International Labor Organization Conventions & Recommendations
Wages and benefits	Among the eight fundamentals of conventions, the seventh convention is 'Equal Remuneration Convention, 1951' which refers to rates of remuneration established without discrimination based on sex.
Customer requirements	International Labor Organization Conventions & Recommendations does not discuss with customer requirements.
Workplace health and safety practices	Occupational Safety and Health Convention, 1981 argues the right of health and safety at workplace of the workers
Food, housing, and sanitation	Social Security (Minimum Standards) Convention, 1952 states to protect the minimum social security of the workers.
Child labor or forced labor	The fourth convention states about Abolition of Forced Labour Convention, 1957 which totally abolishes any kind of forced and compulsory labor. The seventh conventions states about Worst Forms of Child Labor Convention, 1999 which refers to children under age 18 and all forms of slavery or practices similar to slavery, such as the sale and trafficking of children, debt bondage and serfdom and forced or compulsory labor, including forced or compulsory recruitment of children for use in armed conflict are prohibited under these conventions.
Commitment of top management	This is not included in the area of the conventions.
Education and training of employees	Employment and occupation include access to vocational training, access to employment and to particular occupations, and terms and conditions of employment.
Non-discrimination	Discrimination (Employment and Occupation) Convention, 1958 includes any distinction, exclusion or preference made on the basis of race, color, sex, religion, political opinion, national extraction or social origin, which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation.
Anti-corruption	This is not included in the area of the conventions.
Working hours	Weekly Rest (Industry) Convention, 1921 (No. 14) states the working hours for the workers and reserves the weekly rest hours for the workers.

2007; Mani et al., 2016a,b; Silvestre et al., 2018). Machine safeguarding ensures safety features on and around manufacturing or other engineering equipment to minimize the risk of serious accidents. During the operation of a machine or accidental contact with it, the operator or others in the vicinity may get injured; therefore, the hazards must be either controlled or eliminated (Khan, 2017).

Diversity management ensures company initiatives are undertaken to include all employees in the company programs and aims to build informal social networks across the supply chain (Mani et al., 2015; Martins and Pato, 2019). Suppliers and manufacturers are constantly facing pressure from stakeholders to incorporate sustainability in supply chains (Gauthier, 2005; Pressley et al., 2007). Suppliers and manufacturers need to redesign supply chains by considering stakeholders' involvement in operations (Kausar et al., 2017). Supply chain decisions must reflect stakeholders' interests with an emphasis on morals and values to maximize social responsibility in supply chains. *Fire safety refers to the steps and measures taken* to reduce the destruction caused by *fire*. Fire safety programs and initiatives can save the loss of human lives (Attaran, 2007).

Organizations must take appropriate measures for reducing accidents. Proactive actions are the best ways to reduce accidents in the workplace. This relates to avoiding excessive working hours and inadequate periods of rest, which can harm workers' health and increase the risk of accidents during work (Presutti, 2003; Bai and Sarkis, 2010; Govindan et al., 2013). Compliance refers to the conformation of meeting requirements of accepted practices or the act of obeying an order, rule, or request (Saleh and Roslin, 2015; Sarkis et al., 2010; Zhang et al., 2013).

Sustainable employment practices describe an enduring, mutually-beneficial, and purposeful working engagement between the employer and the employees. Sustainable employment practices reduce employee turnover and absenteeism and increase overall productivity (Bai and Sarkis, 2010; Govindan et al., 2013). In this study, 19 social sustainability enablers are identified from the extended literature review. The actual comparison of identified enablers with the International Labor Organization Conventions & Recommendations are presented in Table 1.

3. Theoretical framework

The proposed research framework is shown in Fig. 2. This framework helped to uncover the most influential enablers to social sustainability in a footwear company's supply chain. The steps to apply the framework are as follows:

- Enablers were determined from reviewing literature and experts' feedback. A total of 19 enablers were identified.
- 10 enablers were selected on the basis of opinions from company managers and academic experts.
- BWM was applied to determine the importance of these enablers and to prioritize based on the weight of each enabler.
- After evaluating the results of BWM, the enablers were ranked.

Table 2
Best and worst enabler of social sustainability identified by experts.

Name of enablers	Notation	Best enabler identified by experts	Worst enabler identified by experts
Wages and benefits	SSE1	EX1, EX3, EX5, EX8	
Customer requirements	SSE2	EX6, EX7	
Workplace health and safety practices	SSE3		EX4
Food, housing and sanitation	SSE4	EX2	EX5, EX10
Child labor or forced labor	SSE5	EX9	
Commitment of top management	SSE6	EX4, EX11, EX12	
Education and training of employees	SSE7		EX3, EX11
Non-discrimination	SSE8	EX10	EX6
Anti-corruption	SSE9		EX1, EX7, EX9
Working hours	SSE10		EX2, EX8, EX12

Notations: SSE — social sustainability enabler, EX — expert.

- The results were communicated with the company managers, and managerial implications of the research were suggested.

3.1. Procedure for the Best-Worst method

To assess the enablers, the procedure of the BWM (Rezaei, 2015, 2016) is structured as follows:

Step 1. ***Identify a set of decision-making criteria.***
In this step, a set of criteria $\{c_1, c_2, \ldots, c_n\}$ is selected for decision-making.

Step 2. ***Identify the best and worst criterion.***
The best criterion (i.e. most important, most desirable) and the worst criterion (i.e. least important, least desirable) are recognized by the decision-maker.

Step 3. ***Evaluate the preference of the best criterion over others.***
The preference of the best criterion over all the other criteria is expressed using a scale from one to nine, where one and nine indicate equal and extreme preferences between the best criteria over the other criterion, respectively. This preference represents the Best-to-Others (BO) vector which would be: $A_B = (a_{B1}, a_{B2}, \ldots, a_{Bn})$, where a_{Bj} indicates the preference of the best criterion B over criterion j, and it can be assumed that $a_{BB}=1$.

Step 4. ***Evaluate the preference of all criteria over the worst criterion.***
The preference of all criteria over the worst criterion is also expressed using a scale from one to nine. The preference of this step indicates the Others-to-Worst (OW) vector which would be: $A_w = (a_{1w}, a_{2w} \ldots a_{nw})^T$ where a_{jw} shows the preference of the criterion j over the worst criterion W. It is assumed that $a_{ww}=1$.

Step 5. ***Determining the most favorable weight.***
The optimal weights of the criteria $(w_1^*, w_2^*, \ldots, w_n^*)$ are calculated and will satisfy the following requirements. For each pair of w_j/w_W and w_B/w_j, the ideal situation is where $w_j/w_W = a_{jW}$ and $w_B/w_j = a_{Bj}$. To find a solution closer to the ideal situation, the maximum among the set of $\{|w_B - a_{Bj}w_j|, |w_j - a_{jw}\ w_w|\}$ must be minimized, and the problem can be formulated as:

$\min \max_j \{|w_B - a_{Bj}w_j|, |w_j - a_{jW}\ w_W|\}$

Subject to

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

$w_j \geq 0$, for all j

Eq. (1) can be transferred to a linear programming problem as follows:

$\min \xi^L$

subject to

$|w_B - a_{Bj}w_j| \leq \xi^L$, *for all* j

$|w_j - a_{jw}w_w| \leq \xi^L$, *for all* j

$$\sum_j w_j = 1 \tag{2}$$

$w_j \geq 0$, for all j

The optimal weights $(w_1^*, w_2^*, \ldots, w_n^*)$ and ξ^{L*} are obtained after solving Eq. (2). ξ^{L*} is used to indicate the consistency of the comparison systems. When the value of ξ^{L*} equals zero, the consistency becomes very high, and consequently, the comparisons become more reliable.

4. Application of the proposed framework

This research applies the BWM framework to a leather footwear supply chain in Bangladesh. The footwear sector contributes a major portion and become a multi-billion dollar export industry. Leather goods were declared as the national product of 2017 in Bangladesh (Moktadir et al., 2018a,b).

4.1. Case selection

To test the proposed BWM framework, a footwear company, herein called ABC footwear Ltd., was selected. Due to confidentiality, the real name of the company is not mentioned here. ABC Footwear Ltd. was established in 2006. It is located in Uloshara, Kaliakoir, Gazipur. The footprint of ABC Footwear Ltd. is 6000 m^2 with an annual production of 1,800,000 pairs of shoes. There are 3000 employees. ABC Footwear Ltd. exports footwear to many developed countries including the UK, Italy, Germany and Canada. As the international buyers are becoming more and more conscious and concerned about social sustainability issues it is imperative for the company to meet the social sustainability standards to survive in the age of intense global competition. Thus identifying the enablers of social sustainability is of utmost importance to ABC Footwear Ltd.

Currently this footwear company is paying attention to implementing supply chain social sustainability practices to fulfill the target of achieving sustainability by 2030. For this purpose, enablers for making the company socially sustainable must be identified. The management of this company has agreed to take part in the proposed BWM methodology of this paper to identify the enablers. This study will ease the path toward social sustainability by determining the most influential enablers. This study identified the 10 most important enablers from the literature review and the opinion of experts. The data collection procedure is discussed in the next section.

4.2. Data collection and application of the Best-Worst method

To collect data, a team of experts was formed. The team was comprised of 12 members, of which four were academics

Table 3
Vector of best to others enablers for expert 1.

Expert-1	SSE1	SSE2	SSE3	SSE4	SSE5	SSE6	SSE7	SSE8	SSE9	SSE10
Best (SSE1)	1	4	6	5	7	5	9	2	6	8

and eight were industrial managers. The four academic experts (EX1, EX2, EX3, and EX4) performed research in the field of sustainable supply chain management, energy-efficient supply chain planning, leather production management, sustainable system analytics, and decision support systems. The profile of the other eight industrial experts is discussed in the in Table A.1. Company experts are those professionally educated who can help us find the enablers to the social sustainable supply chain because of their hands-on experience on this matter through their long experience in the corporate arena. Academicians are very generic and can find out the enablers by doing core level research on this topic. We selected both of them so that we could have very deep insight into the enablers to make a comprehensive study on the social sustainable supply chain. In this study, data were collected in two stages, which are discussed below.

Stage 1: Selecting the most influential enablers to implement social sustainability in supply chain management practices.

After reviewing the literature and taking experts' feedback, a total of 19 enablers were primarily selected. These enablers may vary from industry to industry and country to country. To identify the most relevant enablers in the context of the selected footwear company, the company managers were asked to include or exclude any enablers. To do this, we have sent this list of 19 enablers to experts and they marked 'yes' if it was suitable and marked "no' if not suitable. After receiving the feedback from experts, the maximum number of 'yes' we have taken into consideration for the study with the consultation of academic experts. In this study, the ten most important enablers were selected based on experts' feedback. Therefore, the selected enablers were further assessed through the BWM. The selected enablers are shown in Table 2.

Stage 2: Assessing selected enablers to prioritize through the Best Worst method.

The objectives of this study were to identify and assess the enablers and to prioritize through BWM. To meet the predefined objectives, experts gave opinions about the best enabler and the worst enabler and placed the others between. The procedure of this selection is given in Section 3.1. The selected best enablers and worst enablers via experts are reflected in Table 2.

Stage 3: Selecting the best enabler's over all enablers using scale of 1–9

The experts were asked to identify the best enabler's over all other enablers in the third step using a one to nine measurement scale. For more clarification, the vector of best to others enablers is given in Table 3, which is obtained from expert 1. The vectors of best to other enablers are given in Table A.2 for the remaining eleven experts.

Stage 4: Determining all others enablers' over the worst enabler using scale of 1–9

In this step, the experts were asked to rate all the enablers over the worst enabler with a questionnaire using a one to nine measurement scale. The vector of others to the worst enablers for expert 1 is given in Table 4. The experts' feedback from step 3 and step 4 for the remaining eleven experts is shown in Table A.2.

Stage 5: Determining the optimal weights of enablers

The optimal weights of the enablers for each expert were established using Eq. (2) by fulfilling all constraints (for more details please see step 5 in Section 3.1). As for example, the BWM model for expert 1 is given below:

Table 4
Vector of others to worst enablers for expert 1.

Expert 1	Worst (SSE9)
SSE1	4
SSE2	7
SSE3	8
SSE4	2
SSE5	3
SSE6	6
SSE7	9
SSE8	3
SSE9	1
SSE10	4

Table 5
Optimal weights of each enabler from expert 1.

Enablers	Weight	K*
w(SSE1)	0.2587	0.1646
w(SSE2)	0.1058	
w(SSE3)	0.0706	
w(SSE4)	0.0847	
w(SSE5)	0.0605	
w(SSE6)	0.0847	
w(SSE7)	0.0470	
w(SSE8)	0.2117	
w(SSE9)	0.0235	
w(SSE10)	0.0529	

$$\min,\ \xi^{L}$$

Subject to,

$$|w_{SSE1} - 1w_{SSE1}| \le \xi^{L};\ |w_{SSE1} - 4w_{SSE2}| \le \xi^{L};$$
$$|w_{SSE1} - 6w_{SSE3}| \le \xi^{L};\ |w_{SSE1} - 5w_{SSE4}| \le \xi^{L};$$
$$|w_{SSE1} - 7w_{SSE5}| \le \xi^{L};\ |w_{SSE1} - 5w_{SSE6}| \le \xi^{L};$$
$$|w_{SSE1} - 9w_{SSE7}| \le \xi^{L};\ |w_{SSE1} - 2w_{SSE8}| \le \xi^{L};$$
$$|w_{CH3} - 6w_{SSE9}| \le \xi^{L};\ |w_{SSE1} - 8w_{SSE10}| \le \xi^{L};$$
$$|w_{SSE1} - 4w_{SSE9}| \le \xi^{L};\ |w_{SSE2} - 7w_{SSE9}| \le \xi^{L};$$
$$|w_{SSE3} - 8w_{SSE9}| \le \xi^{L};\ |w_{SSE4} - 2w_{SSE9}| \le \xi^{L};$$
$$|w_{SSE5} - 3w_{SSE9}| \le \xi^{L};\ |w_{SSE6} - 6w_{SSE9}| \le \xi^{L};$$
$$|w_{SSE7} - 9w_{SSE9}| \le \xi^{L};\ |w_{SSE8} - 3w_{SSE9}| \le \xi^{L};$$
$$|w_{SSE9} - 1w_{SSE9}| \le \xi^{L};\ |w_{SSE10} - 4w_{SSE9}| \le \xi^{L}$$
$$w_{SSE1} + w_{SSE2} + w_{SSE3} + w_{SSE4} + w_{SSE5} + w_{SSE6} + w_{SSE7} + w_{SSE8} + w_{SSE9} + w_{SSE10} = 1$$
$$w_{SSE1}, w_{SSE2}, w_{SSE3}, w_{SSE4}, w_{SSE5}, w_{SSE6}, w_{SSE7}, w_{SSE8}, w_{SSE9}, w_{SSE10} \ge 0$$

The optimal weights of objective function and enablers for expert 1 are shown in Table 5.

Similarly, other BWM models for remaining experts are developed using Eq. (2) and the optimal weights of each enabler for the remaining experts are calculated and obtained. Therefore, for each enabler, a simple weighted average was calculated to find a single weight vector, which specifies the average consistency ratio (ξ^{L*}) close to zero.

4.3. Results and discussions

The results of the Best Worst method are presented in Table 6. Based on the average weight for each enabler, the enablers were ranked as follows:

SSE3 > SSE1 > SSE2 > SSE8 > SSE6 > SSE4 > SSE5 > SSE9 > SSE10 > SSE7.

According to Table 6, workplace health and safety practices (SSE3) received the highest weight at 0.1773. Therefore, workplace health and safety practices should be considered as the most important enabler for the footwear industry in Bangladesh.

Table 6
Average weights and ranking of the enablers.

Notation	Enablers	Ranking	Average weights	Standard deviation
SSE3	Workplace health and safety practices	1	0.1773	0.0709
SSE1	Wages and benefits	2	0.1535	0.0719
SSE2	Customer requirements	3	0.1402	0.0657
SSE8	Non-discrimination	4	0.1155	0.0690
SSE6	Commitment of top management	5	0.1125	0.0810
SSE4	Food, housing and sanitation	6	0.0892	0.0423
SSE5	Child labor or forced labor	7	0.0725	0.0415
SSE9	Anti-corruption	8	0.0539	0.0230
SSE10	Working hours	9	0.0418	0.0133
SSE7	Education and training of employees	10	0.0403	0.0157

Management should take appropriate steps to maintain the hygiene of the manufacturing area. Companies need to be well-ventilated and cleaned for a fume- and dust-free workplace. Management should focus on workplace health and safety practices to ensure safe drinking water, sufficient lighting, and safeguards for probable accidents.

The second highest weight was 0.1535 corresponding to wages and benefits (SSE1). This was important because it ensured payment of wages, minimum wage levels fixing, promotion of equal pay for work of equal value and the resolution of voluntary wages in case of employer bankruptcy. This was followed by customer requirements (SSE2) with a weight of 0.1402, and non-discrimination (SSE8) with a weight of 0.1155.

The results also revealed that workplace health and safety practices require the most managerial attention to establish social sustainability in the footwear supply chain. According to Table 6, the commitment of top management (SSE6) was the fifth social sustainability enabler, with a weight of 0.1125. This enabler is also important because each and every activity of a firm is decided by top management. This will ensure the continuous progress of the footwear manufacturing company, where top management motivates the employees on manufacturing and business strategies to improve social responsibilities.

Food, housing, and sanitation (SSE4) and child labor or forced labor (SSE5) with weights of 0.0892 and 0.0725 were ranked sixth and seventh, respectively. Ignoring proper food, housing and sanitation will not allow for a company to be socially sustainable. A sustainable working environment does not allow *child labor*. Anti-corruption (SSE9) was ranked eighth with a weight of 0.0539. Finally, working hours (SSE10) was ranked ninth with a weight of 0.0418, and education and training of employees (SSE7) was ranked tenth with a weight of 0.0403. The results mainly depend on how the managers decide which enablers must be focused on.

4.4. Sensitivity analysis

Sensitivity analysis was used to test the robustness and to check the bias in results. In a sensitivity analysis, the weight of one enabler is varied, and the corresponding changes in weights of the other enablers are examined.

There are a number of ways to perform sensitivity analysis. The level of weights can be changed for an expert or the level of weight for the different enablers can be changed. In this study, the sensitivity analysis was conducted by varying the weights of all the enablers in proportion to the variation of the top-ranked enabler's weight. The weights of all the enablers and the ranking of the enablers are shown in Tables A.3 and A.4. The weight of the top-ranked enabler was varied from 0.1 to 0.9. Based on the weights shown in Table A.3, the enablers were ranked as given in Table A.4. It is clear from the tables that SSE3 held the first position in the sensitivity analysis. Fig. 3 shows the weights of the selected enablers.

Table A.1
Profile of managers at ABC Footwear Ltd.

Industrial experts	Position
Expert 5 (Ex5)	Product development manager
Expert 6 (Ex6)	Production manager 1
Expert 7 (Ex7)	Production manager 2
Expert 8 (Ex8)	Supply chain manager
Expert 9 (Ex9)	Logistics manager
Expert 10 (Ex10)	Human resource manager
Expert 11 (Ex11)	Quality control manager
Expert 12 (Ex12)	Costing manager

From Fig. 3, the weight of the enabler was varied using the variation of weight of the top-ranked enabler, with respect to the change in value from 0.1776 to 0.1, the remaining value of 0.0776 was assigned to the other enablers proportionally. Therefore, the weight of the other enablers was changed and the changes in the ranking were noted. Similarly, other iterations were constructed.

Fig. 3 indicates that during the weight of 0.1, the ranking of enablers SSE1, SSE2, SSE3, SSE6 and SSE8 were displaced from the original position. However, all the other enablers' rankings were not displaced. The results are consistent if there is any variation in the weights of one enabler. The figure also reveals that regardless of the values of the enabler, workplace health and safety practices (SSE3) held the top position, and education and training of employees (SSE7) held the last position in most of the trials during sensitivity analysis.

Based on the weight changes in the sensitivity analysis, the ranking of enablers was noted. From Fig. 4, it is clear that at a weight of 0.1, the ranking of enablers did not vary significantly. The ranking of the enablers SSE1, SSE2, SSE3, SSE6, and SSE8 were varied from the obtained ranking. At weights of 0.2 to 0.5, there was no change in ranking. At a weight of 0.6, some changes occurred in the enabler ranking. Thus, Fig. 4 ensures that the obtained ranking is robust enough to make a decision regarding social sustainability implementation in the footwear supply chain.

Finally, after analyzing all the tables and figures of the sensitivity analysis, it can be shown that the results obtained from the BWM were free from bias.

5. Implication to theory and practices

5.1. Implications to theory

This study provides several theoretical contributions to the current literature field of SSCM. These are:

1. Addressing the relatively neglected social aspect of the sustainable supply chain.
2. Addressing a lack of research about the sustainable supply chain in an emerging economy.

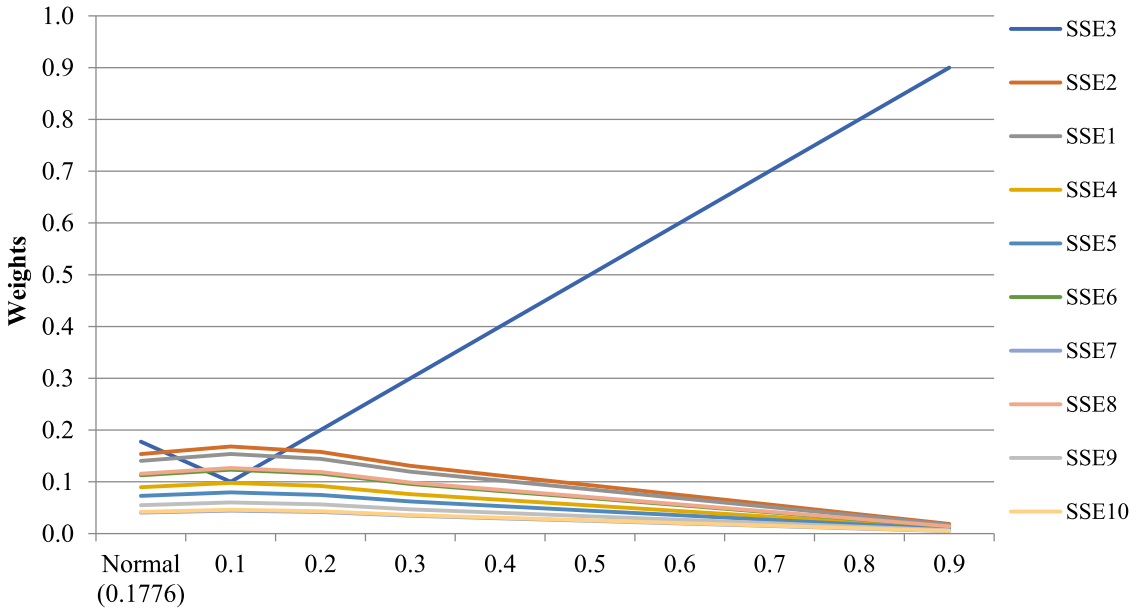

Fig. 3. Weights of selected enablers during sensitivity analysis.

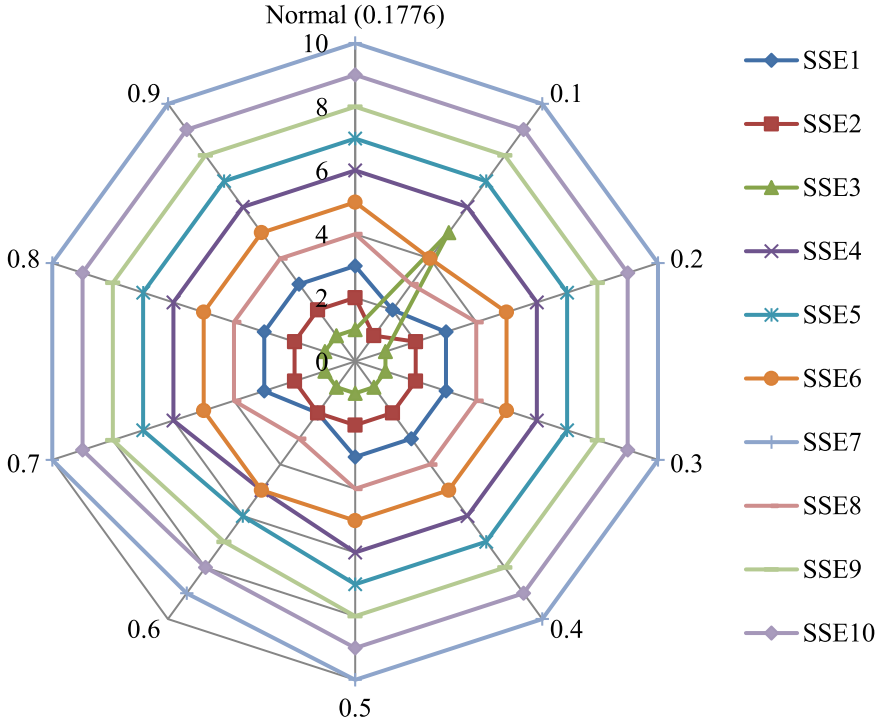

Fig. 4. Ranking of selected enablers during sensitivity analysis.

3. Conducting research on the most influential enablers sustainable supply chain of the footwear industry, which is absent in the existing literature.
4. Identifying the most influential enablers by means of an exhaustive literature review and collecting and conflating different experts' opinions.
5. Providing a comprehensive procedure based on the Best Worst method to rank the identified enablers.
6. Ranking the enablers so that the managers and industry expert can focus their effort in achieving the sustainable supply chain more efficiently.
7. Providing guidelines to industry managers in developing long term strategies in achieving the sustainable supply chain.

5.2. Implications to practices

This study is expected to guide managers and planners in the footwear industry of Bangladesh to identify the most influential enablers to social sustainability in supply chains. Competition in the global market is pressuring organizations to devise strategies that integrate social, economic and environmental practices to achieving sustainability across the supply chain. Identifying and

Table A.2
Assessment of social sustainability enablers by experts.

Expert		SSE1	SSE2	SSE3	SSE4	SSE5	SSE6	SSE7	SSE8	SSE9	SSE10
Expert 2	Best (SSE4)	4	3	1	1	6	6	9	3	7	8
	Worst (SSE10)	4	6	9	3	1	6	9	4	7	1
Expert 3	Best (SSE1)	1	4	2	6	5	5	8	3	8	9
	Worst (SSE7)	2	5	8	3	2	4	1	5	7	9
Expert 4	Best (SSE6)	2	5	3	4	7	1	9	8	6	7
	Worst (SSE3)	3	7	1	4	2	5	7	6	8	9
Expert 5	Best (SSE1)	1	5	2	6	8	6	9	3	7	8
	Worst (SSE4)	2	6	8	1	3	4	2	7	4	9
Expert 6	Best (SSE2)	4	1	3	5	6	7	8	5	4	9
	Worst (SSE8)	3	7	9	3	4	5	2	1	6	8
Expert 7	Best (SSE2)	4	1	2	4	7	6	8	5	7	9
	Worst (SSE9)	2	5	7	3	2	4	6	8	1	4
Expert 8	Best (SSE1)	1	3	2	4	7	6	8	5	7	9
	Worst (SSE10)	2	5	7	3	2	4	6	8	9	1
Expert 9	Best (SSE5)	4	3	2	4	1	6	8	2	7	9
	Worst (SSE9)	2	5	7	3	2	4	6	8	1	6
Expert 10	Best (SSE8)	4	3	2	4	7	6	8	1	7	9
	Worst (SSE4)	2	5	7	1	2	4	6	8	9	3
Expert 11	Best (SSE6)	4	3	2	4	7	1	8	8	7	9
	Worst (SSE7)	2	5	7	3	2	4	1	8	9	3
Expert 12	Best (SSE6)	4	3	2	4	7	1	8	5	7	9
	Worst (SSE10)	2	5	7	3	2	4	6	8	9	1

Table A.3
Weights of selected enablers during sensitivity analysis.

Selected enabler	Normal (0.1776)	Values of preference weights for listed enabler								
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
SSE1	0.1405	0.1537	0.1443	0.1196	0.1025	0.0854	0.0683	0.0512	0.0342	0.0171
SSE2	0.1537	0.1682	0.1579	0.1308	0.1121	0.0934	0.0748	0.0561	0.0374	0.0187
SSE3	0.1776	0.1000	0.2000	0.3000	0.4000	0.5000	0.6000	0.7000	0.8000	0.9000
SSE4	0.0895	0.0979	0.0919	0.0762	0.0653	0.0544	0.0435	0.0326	0.0218	0.0109
SSE5	0.0728	0.0796	0.0748	0.0619	0.0531	0.0442	0.0354	0.0265	0.0177	0.0088
SSE6	0.1128	0.1234	0.1158	0.0960	0.0823	0.0686	0.0548	0.0411	0.0274	0.0137
SSE7	0.0405	0.0443	0.0416	0.0345	0.0295	0.0246	0.0197	0.0148	0.0098	0.0049
SSE8	0.1157	0.1266	0.1189	0.0985	0.0844	0.0704	0.0563	0.0422	0.0281	0.0141
SSE9	0.0550	0.0602	0.0565	0.0468	0.0401	0.0334	0.0267	0.0201	0.0134	0.0067
SSE10	0.0420	0.0460	0.0431	0.0357	0.0306	0.0255	0.0204	0.0153	0.0102	0.0051
Total	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table A.4
Ranking of selected enablers during sensitivity analysis.

Selected enabler	Normal (0.1776)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
SSE1	3	2	3	3	3	3	2	3	3	3
SSE2	2	1	2	2	2	2	2	2	2	2
SSE3	1	5	1	1	1	1	1	1	1	1
SSE4	6	6	6	6	6	6	5	6	6	6
SSE5	7	7	7	7	7	7	6	7	7	7
SSE6	5	4	5	5	5	5	5	5	5	5
SSE7	10	10	10	10	10	10	9	10	10	10
SSE8	4	3	4	4	4	4	3	4	4	4
SSE9	8	8	8	8	8	8	7	8	8	8
SSE10	9	9	9	9	9	9	8	9	9	9

analyzing the most influential enablers are essential for taking sustainable development initiatives and developing integrated strategies. The ranking of enablers may help managers to make a quick decision during implementing social sustainability initiatives in supply chains. The results suggest that managers should focus on developing and maintaining workplace health and safety guidelines first. Then, they should focus on ensuring proper wage and benefits for employees. Fulfilling customer requirements, nondiscriminatory policies, top management commitment are also important enablers that managers and executives should focus on for the leather footwear industry of Bangladesh. Managers working in the footwear industry can utilize the results of this work to adopt social sustainability initiatives, which can assist companies in achieving sustainable development goals.

6. Conclusions, limitations, and future research agenda

Due to stakeholders' pressure, policies and the government's requirement, organizations are being forced to adopt social sustainability practices in the existing supply chain. Hence, it is necessary for managers to identify the enablers to supply chain

social sustainability. This study identified and analyzed the most influential enablers to socially sustainable supply chains. A BWM framework was formulated and applied to a real industrial case to assess enablers to social sustainability for a footwear supplier chain in Bangladesh. The BWM was able to evaluate the most significant enablers. The results indicated that workplace health and safety practices, wages and benefits, and customer requirements were the top three enablers to make the traditional supply chain socially sustainable.

The present work identified and ranked enablers of social sustainability that are applicable to the footwear industry context of Bangladesh may be applicable to other industries or other countries with some modifications. This study is novel in terms of the industry and the country context. Thus, this study is distinguishable from the work of Badri Ahmadi et al. (2017) who identified factors of social sustainability for industries of Iran. Even though two enablers i.e., 'workplace health and safety' and 'education and training' are common to both studies, the other 17 enablers of social sustainability in this study are unique to the footwear industry of Bangladesh and are absent in Iranian context (Badri Ahmadi et al., 2017). 'Workplace health and safety' has been ranked the most important enabler in the footwear industry unlike the Iranian context where the factor was the second most important factor. Education and training ranks tenth or last in this study whereas it ranks third in Iranian industries. These differences indicate that supply chain sustainability are highly specific and vary from industry to industry and from country to country. Thus, enablers for different industries and different countries should be examined separately.

This study has some limitations. Only nineteen enablers of social sustainability were identified from the literature and ten of them were selected for assessing the social sustainability of a real-world industrial supply chains. This research can be extended by including fuzziness in human decision making. Considering more enablers, this research also offers opportunities of research in other industries, including garments, leather goods, food processing, chemical, pharmaceuticals, and so on.

Appendix

See Tables A.1–A.4.

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