DEVELOPMENT OF THE SUSTAINABILITY INDEX FOR THE READY-MADE GARMENTS SECTOR IN BANGLADESH

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Abstract. The aim of this research is to develop a simple and easily useable scale to assess sustainable development in the ready-made garments (RMG) sector in Bangladesh. A framework has been proposed where sustainable development dimensions, sub-dimensions (or variables) under dimensions, and items under sub-dimensions, are developed through an extensive literature review. This framework serves as the base for index development in this study. The proposed framework comes in the form of a questionnaire. After receiving satisfactory results from the pilot study, further information was gathered from the Tier 1 RMG factories in Bangladesh using the proposed questionnaire. Excluding the incomplete responses, a total of 238 responses were considered for further analysis. Following this, the collected data were passed through a number of statistical processes including item-total correlation and CFA (Confirmatory Factor Analysis). After rigorous analysis, only 30 items were shown to be model fit according to the proposed second-order sustainability index model. Finally, the results of factor loading showed that dimensions load very well on the proposed framework. Therefore, this study culminated in developing a 30-item valid and reliable sustainability index for three dimensions: economic, environmental, and social, for the Bangladeshi RMG sector.

Keywords: sustainability, index, ready-made garments, Bangladesh, economic dimension, social dimension, environmental dimension.

JEL Classification: O130, Q010, Q560.

> *"There is only one alternative to sustainability: Unsustainability"* (Bossel, 1999, p. 1).

Introduction

Roughly every twenty years, the world's economy doubles, and the population doubles every half century, but natural resources are not growing (Meadows 1998). But in the process of developing ourselves, we are exploiting natural resources, which have endangered the world's ecosystem. Development is a continuous and indispensable process, a fact that we cannot deny. Now, the question is how can we continue our development process without doing any harm to the ecosystem and our healthy social lives? To find the answer to these issues, the term "sustainable development"

or "sustainability" has emerged. Nowadays, the biggest businesses in the world, such as Toyota, Honda, GE, Puma, Unilever and so on, are keen to transform their businesses into green ones (Benn et al. 2014).

To proceed to sustainable development, we need to have proper indicators. As the nature of change is not the same throughout the world, it is hard to frame common sets of indicators for all. Since the governments of the world and the UN are encouraging sustainable development, most of the measures have been developed to assess sustainability at national, regional or communal level. Although some frameworks include an "institutional" level of assessment, as the UN has directed (UNCSD 2001), far less work has been done to assess sustainability at the organization level

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(Veleva and Ellenbecker 2000). Thus, the author of this paper has built a framework for the sustainability of a specific sector of a specific country, where such development has become urgent.

1. Problem statement

In the late seventies, the export-oriented apparel industry or ready-made garments industry (RMG) started their journey in Bangladesh. With the help of the guaranteed customer through the Multi-Fibre Agreement (MFA) of GATT entrepreneurs took the opportunity to boost their businesses, and the Bangladeshi government helped them duly at that time. In the four decades since then, the RMG sector has become a leading export earning sector for the country, contributing to almost 80% of the total export. The growth in the export market was US$ 12 million in 1984/85 increasing to US$ 21.5 Billion in 2012/13. Currently, there are around 4500 big, medium and small garments industries and almost four million people working for them (Export Promotion Bureau, Bangladesh, 2015). The arrival of the garments industry reduced poverty significantly, from 70% during the late 1970s, to less than 20% currently. Not only has there been poverty alleviation, it has also increased life expectancy, literacy rates and per capita food intake. Bangladesh's economy has grown nearly 6% every year since the mid-1990s (World Bank 2014). The ready-made garments industry did not exist during independence of the country in 1971, but in the last four decades, it has become one of the leading apparel suppliers of the world. During the 1990s, Bangladesh supplied only 0.6% of the total of apparel products throughout the world, and it rose to 5% by 2011 and that share is consistent until now (International Labor Organization 2013). Besides significant economic growth, it shows a significant human development and empowerment of women.

Although the country has seen a booming growth in the industry, and development of the economy and workforce, some issues have been observed and noted. Exploitation, social degradation, environmental pollution and so on are the residuals of this development. Hundreds of people have died as a result of some accidents during last few years. There was a fire in Tazreen, and a building collapsed in Rana Plaza. Moreover, employee unrest is very common in this sector. By not following the ILO's convention, the country's existing law is believed to be the major reason for such incidents (Yunus and Yamagata 2012). Very often, human rights' issues are questioned in this sector as the discussed sector pays one of the lowest wage rates in the world (Salam and Mclean 2014). As this sector proved to be very important for the economy and employment of this overpopulated country, survival and sustainable development in this sector has become a current issue. Furthermore, there is a new worldwide trend for "sustainable fashion," especially in developed

countries, who are the major buyers of RMG products from Bangladesh. The term sustainable fashion is defined as the production and distribution of clothes/garments following fair trade principles, which are environmentally and labour-friendly, do not use hazardous chemicals and other harmful materials, do not exploit workers, follow an ethical code of conduct and use recycled materials as much as possible (Fletcher 2008, Joergens 2006). Therefore, to survive in the race, the industry must address this issue.

2. Purpose of the study

The main objective of this paper is to develop a sustainability index for the RMG sector in Bangladesh. Therefore, the first concern of this paper is to figure out the RMG industry-specific sustainable development (SD) indicators of the three aspects of SD: economic, environmental and social, based on previous literature.

As existing sustainable development scales do not provide unidirectional assessment or a "simple measurement of SD", effort has made to create a simple but representative scale and assessment framework for sustainable development in the ready-made garments sector in Bangladesh.

3. Defining sustainable development

The term sustainable development literally means to be able to maintain progress, and to be accepted over time. However, it was defined differently in different sectors to fit users' purposes. By early 1990s, more than seventy definitions of sustainable development were discovered by Holmberg and Sandbrook (1992). Although there are a number of definitions for this term, the Boston Consulting Group (BCG) showed that two-thirds of sustainability experts, who are mainly business leaders, define sustainable development using the Brundtland Commission (WCED 1987) and/or the TBL (Elkington 1998) definition (BCG 2009).

It is worthwhile mentioning here that the concept of sustainability was adopted from agro-biology; and the term was defined as a system capacity to maintain productivity even in an adverse situation (Jimenez-Herrero 2000). This is also true for realities other than agriculture, as we have to grow and sustain even though we are facing difficulties, challenges and unfavourable conditions in the real world.

According to Docherty et al. (2002), sustainability encompasses three levels: individual, organizational and societal. Sustainability at one level cannot be achieved by exploiting others because all these levels are closely related to each other and to the organization's stakeholders (i.e. personnel, customers, owners, and society). That means we need to balance the level of development among individuals, organizations, and society. Achievement of sustainable development is not possible if one of them is ignored.

4. Measurement of sustainable development: dimensions and variables

Though sustainability is a major concern in many walks of life, a common standard to measure sustainability has yet to be found. Businesses vary in nature as they have diverse activities; besides, different countries have different business styles and policies. Therefore, it is difficult to have the same yardstick to measure the SD of all businesses (Goyal et al. 2013, Whitley 1992). This fact has inspired the authors to find a country and sector-specific scale and study to assess sustainability and to help grow industry sustainability. Some researchers (Salzmann et al. 2015) opine that country and sector-specific research in the area of SD could provide more accurate and reliable measures. This research looks into the ready-made garments sector of Bangladesh, which is one of the biggest suppliers of ready-made garments all over the world. Recently, several accidents and negative reports have made this sector's position vulnerable in the world market. To grow sustainably and to gain back customers' trust, a proper framework and assessment is needed for this sector.

Sustainable development consists of development in three major areas, economic, environmental and social. From the Brundtland Commission report (WCED 1987) until now, researchers have rarely denied the reality of adding these three in sustainable development. Later Elkington (1998) in his famous book "Cannibals with Forks: The Triple Bottom Line of 21st Century Business", brought the term triple bottom line (TBL), which gave ground for these three dimensions of sustainable development. In these studies, the authors focused on the development of all three areas simultaneously.

Each of the three dimensions has several variables, and the number of variables varies from author to author, or context to context. Some variables are industry-specific and some are general (RobecoSam 2013). Industry specific sub-dimensions are chosen for ready-made garments industry in Bangladesh. Global Industry Classification Standard (GICS) of Standard & Poor's is followed to determine the category of discussed industry; ready-made garments industry falls under industry 252030: Textiles, Apparels & Luxury Goods (Standard & Poor's 2006). Later based in that classification, sub-dimensions are derived by following RobecoSAM's corporate sustainability assessment (RobecoSAM 2013, 2014, 2016). Questionnaire Items to measure the social and environmental sub-dimensions of sustainability are derived from Sustainable Apparel Coalition (SAC) by following the measurement concept of RobecoSAM (RobecoSAM 2014, SAC 2015); for economic dimensions items are derived from Global Reporting Initiative (GRI) to measure the sub-dimensions except financial performance. Questionnaire items to measure financial performance are developed by the authors by adopting the concept of Dess and Robinson (1984). Moreover, questionnaire items derived from different sources are modified accordingly to match the industry and country context.

4.1. Economic dimension

Economic capital has to be maintained sustainably because no business focuses on only short term profit as it instead focuses on gaining profits and surviving. The monetary value of a company's assets gives us an idea about the firm's financial health but cannot inform us about the position in terms of economic sustainability. To know the economic sustainable position, one has to consider several capitals such as the current financial capital, fixed tangible capital, intangible capital and so on. Intangible capital includes the reputation of the company, innovation practice, efficient management, ethical standards and so on.

The economic dimension of sustainability is closely related to the social and environmental dimension (WCED 1987).

For the purpose of this paper, the authors of this paper found some compatible economic variables both from general and sector-specific pool, which are:

4.1.1. Risk and crisis management

Economic dimension does not only focus on financial growth or better performance but also focuses on long-term stable growth which consists of elements such as the ability to recover quickly, having financial backups and so on (RobecoSAM 2013). Areas to consider during risk and crisis management could be as follows: insurance against natural and other disasters, basic coverage against income crisis, and a safety net during the event of a market crisis.

This sub-dimension is measured by using the questions related to the existing risk management culture of the organization; such as "This facility has a proper training program in place throughout the organization on risk management principles".

4.1.2. Compliance

Compliance describes the ability of an organization to act according to an order, set of rules or request. Compliance can be either external rules that are imposed upon an organization as a whole or internal systems of control that are imposed to achieve compliance with the externally imposed rules. In the real world, it means both. In countries like Bangladesh, where anti-corruption laws are not properly implemented, companies are exposed to reputational and legal risks. Evidence of corrupt or illegal practice can result in exclusion from contracts financing authorities, international buyers, and overall international consumers.

Six items questionnaire used to measure this sub-dimension. It includes items as "Corporate codes of conduct

have been defined at the facility for corruption & bribery and Money-laundering and/or insider trading/dealing" and "Dedicated help desks, hotlines and/or complaint boxes are in place".

4.1.3. Supply chain management

A supply chain is defined as "A set of three or more entities (organizations or individuals) directly involved in the upstream or downstream flows of products, services, finances and/or information from a source to a customer" (Mentzer et al. 2001, p. 4). In light of this definition, supply chain management is defined as the coordination of business functions within any specific company and across the businesses within the specific supply chain to improve the performance of both company and supply chain in the long run (Mentzer et al. 2011). This variable aims to identify sustainable supply chain management as an opportunity to improve the long-term financial performance of the garments' factories.

Supply chain management is measured by considering the steps taken by the company to maintain the sustainability practice through the supply chain; such as "The facility has taken measures in order to manage sustainability risks amongst your tier 1 suppliers on Environmental and human rights standards for supplier's processes, products or services".

4.1.4. Financial performance

The main objective of the profit-oriented businesses' organization is to earn money from the business and survive. The Caux Round Table believed that surviving is not the sufficient goal of the business but rather business should always be viable and in good economic health (CRT 2009). This variable is directly related to the financial measure of an organization's current operation which determines whether the company will continue or not.

A six-item modified version of Dess and Robinsons' (1984) subjective financial measure scale is used for this sub-dimension.

4.2. Environmental dimension

Ecosystems are believed to have a limited regeneration capacity and our regular activities (including business, personal and so on) have every chance of impacting the environment negatively such as eroding land, air and water (Bansal 2005), decreasing biodiversity, deforestation, and toxic spills (Doering et al. 2002) and so on. Environmental sustainability is based on the concept that exploitation of natural capital cannot be continued forever (Lovins et al. 1999). Variables in this dimension represent the measurement of the consumption and pollution of the natural resources and the perception/awareness of that. Ideally,

the variables have a long-range history of availability and could measure the impact of a specific project or industry in the environment.

Variables included here are:

4.2.1. Environmental management system

The Environmental Management System (EMS) is believed to be one of the most used approaches to address the environmental bottom line. Elements of EMS include setting up an environmental policy with objectives and targets, adopting a program with a dateline to implement those objectives, measuring and evaluating the effectiveness of the program and reviewing it from time to time to match the program with the organization's operations (Tibor and Feldman 1996). The EMS of any organization (here, the sector) can be a good measure of the environmental sustainability of the product/process. EMS measures the impact of the organization's activity on the nature; a proper measure can help to reduce the adverse effect significantly.

4.2.2. Energy use and emission to air

Direct energy can come from sources including fossil fuels (e.g., coal, petroleum/oil, natural gas) burned on site to generate electricity, steam or heat. Emission to air makes the environment of the locality polluted by creating smoke, smog, acid rain, respiratory problems, blackening buildings and so on. Electricity generation by these facilities and bought electricity from a third-party power company could be harmful to the environment. Setting the record straight for electricity use could be a good way to establish an environmental measurement of sustainable development. Energy use is directly related to the emission to air, furthermore, emission to air might come as the form of the non-processed smoke from machinery, uncontrolled use of biofuels, chemical clouds and so on. Therefore, a six items questionnaire, adopted from SAC (2015), is used to measure this dimension. It includes question such as "This site's environmental management systems certified and/or audited by an independent third party auditor or an accredited internal auditor" and so on.

4.2.3. Waste, wastewater and chemical management

This is a process for evaluating the use of different waste and wastewater treatment methods to understand a factory or facility's accountability towards the environment (Yoshida et al. 2009). Sometimes, due to relaxed government policy and/or implementation of environmental laws, industrial waste is neither collected nor managed.

On the other hand, wastewater management ensures the quality of the wastewater thrown into public canals, rivers, lakes and other public water systems. It includes reducing suspended soils, biodegradable organics, pathogenic

bacteria and nutrients (World Bank Group n.d.). Though wastewater management organizations make sure that their wastewater is not going to change the direction of the canal and river, it is important not to make a dead zone for fish by throwing BOD (biochemical oxygen demand) or dumping anything that could be hazardous for public health. This sub-dimension also includes the use and control of chemicals to avoid the threat to the human body, environment and eco-system.

This sub-dimension includes the measure of quantity and quality of solid and liquid waste the company dumps to the nature as well as use of bio-hazardous chemical. A six-item scale is used which includes item as "This site monitors the quantity and quality of waste and wastewater produced" and "This facility systematically monitors applicable chemical use regulations on a regular basis to ensure compliance and to identify new or changing compliance requirements".

4.3. Social dimension

Although it seems a very limited connection to business with social activities, it is important to measure and assess an organizations' impact on the social systems in which they operate, from the local to global level (Elkington 1998). It could include measurements of education, equity, well-being, quality of life, access to social resources, social capital and so on. Some social issues such as sweatshops, child labour etc. occur due to cost-cutting efforts of the organizations and brands (Niinimäki 2010).

Reporting social dimensions in sustainability assessment has many forms such as: TBL tools (Daizy et al. 2013), CSR principles from the United Nations Global Compact (EC 2011), the ISO social responsibility standard, ISO 26000 (ISO 2014), the GRI sustainability reporting framework (GRI 2014) and so on. The following are variables compatible with the discussed sector of this study.

4.3.1. Labour and workforce management

Employees are the main driving force of the business. Good relationships with employees are one of the most important factors for a business to be successful, especially industries like ready-made garments characterized by organized labour. Labour management includes, but is not limited to, the freedom of association and the recognition of the right to collective bargaining, the elimination of child labour, the abolition of any form of forced labour and equality in terms of gender and ethnicity (both in recruiting and remuneration). This variable also considers the conformance of the local laws and policies regarding labour affairs.

4.3.2. Workplace management

A safe and healthy working environment is another important measurement in the social dimension. It not only means a hygienic workplace but also a fear-free, discrimination-free, and fairly treating organization. In workplace management issues, a properly built factory, safe machinery operating, sanitation, drinking water, workplace security, and so on, are included.

4.3.3. Stakeholders engagement and community impact

Stakeholder engagement matters a great deal in this industry, and some recent accidents and man-made destructions are proof of that. Through stakeholder engagement, companies can create a positive relationship with the stakeholders (labour unions, regulators and/or local community) which in turn, help to reduce unexpected financial and reputational loss (through incidents such as strikes, sabotage and so on). Moreover, a company's philanthropic activities associated with its business size measures the community impact of the business. Hence, this variable measures the internal and external engagement and community impact through employee oriented welfare activities, corporate citizenship and corporate philanthropic activities.

5. Research model

From the discussion above we developed the research model depicted below (Figure 1). This model is the construction of the proposed sustainability index which is mapped from existing literature and models. The sustainability index of this study also considers two components of sustainability in the organization, policy and practice. Therefore, the model is designed to assess from both the policy and practice point of view.

6. Population and sample

As the target sector is ready-made garments (RMG), RMG factories are the main area of interest of this study. The department of Inspection for Factories and Establishment gave a total number of 4809 factories all over the country (DIFE 2016). But unofficially, the number is much higher than that of the government's calculation. Stern Business School of New York University has carried out extensive research and fieldwork on this data. Researchers at Stern Business School compiled data from all the available sources (DIFE, BGMEA, BKMEA, Alliance, and Accord) and deducted mutually inclusive numbers, which gave them a total of 7,179 RMG factories in Bangladesh (Labowitz and Baumann-Pauly 2015).

But all the above-mentioned factories are not producing for foreign brands, but rather a majority of them working as "sub-contractors". This study aimed to collect data from Tier 1 factories, who are the direct exporters to the brands. The Stern Business School team used the UD list (Utilization Declaration) collected from the BGMEA (not
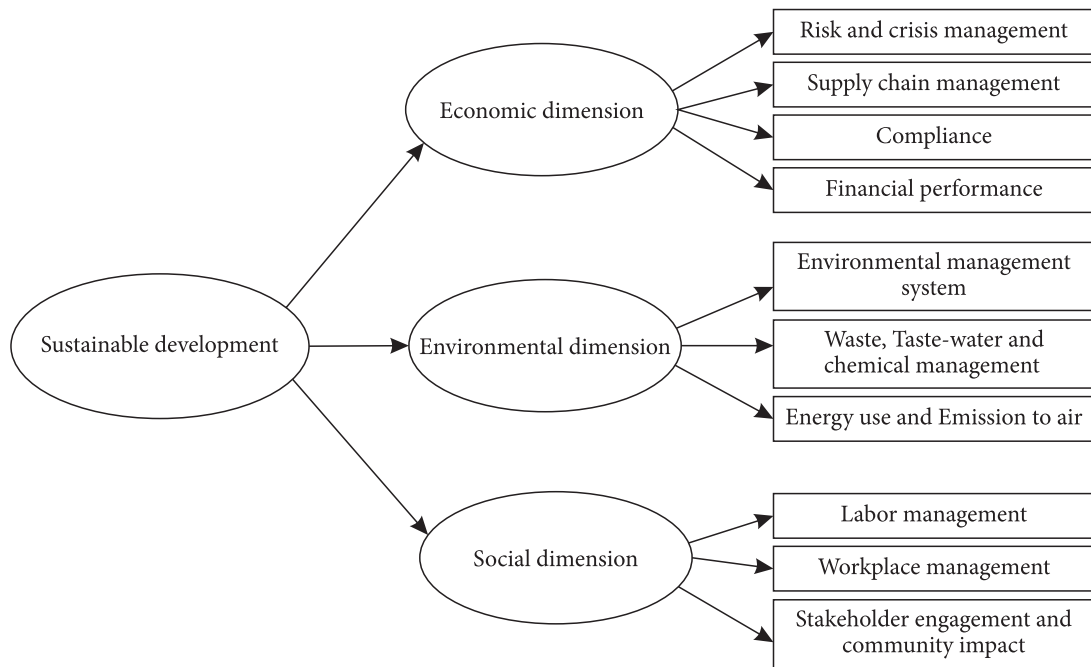
Figure 1. Research model

publicly available) and worked out that there are around 3,200 direct exporter factories in this sector of Bangladesh (Table 1).

Table 1. Number of direct exporting factories
(source: Labowitz and Baumann-Pauly 2015)

	2015
Total export volume, apparel products, Bangladesh	1.57 Billion Units
Number of direct exporting factories	3200
Average units per direct exporting factory	490,625

Hence, the population of this study is 3,200 direct RMG exporter factories in Bangladesh. The sample size is determined using Slovin's formula: n = N / (1 + Ne2), where accepting a 5% error gives us a sample size of 355 facilities/ factories. A convenient sampling technique was used as access as some factories are restricted for security reasons. For the extreme confidentiality of the information of discussed industry, it was not possible to reach the target of 355 factories. After two months of data collection about 290 responses were collected out of which 238 completed questionnaires were qualified to go through the further process.

7. Pilot study

After a rigorous study, the index included 62 items which covered all three dimensions and ten sub-dimensions of

sustainability. A five-point Likert scale is used to develop the index. An item-objective congruence (IOC) conducted by sending the initial questionnaire to two scholars and three practitioners. The result of IOC showed that no item scored less than 0.75.

A pilot study was conducted to test the validity and reliability of the proposed 62 items in the sustainability questionnaire. There were 30 respondents from the human resources and compliance departments of various RMG factories. Responses were taken individually and their reactions were observed. Both a Bengali and an English questionnaire were provided, but respondents chose, without exception, to answer in English.

Cronbach's alpha values of the dimensions of this pilot testing were as follows: Economic dimension 0.875, Social dimension 0.943 and Environmental dimension 0.870 (Table 2).

Table 2. Reliability measures for sustainability dimensions

Dimension	N of Items	Cronbach's Alpha
Economic	24	0.875
Social	20	0.943
Environmental	18	0.870

8. Data collection and analysis

The objective of this study is to develop an index to assess sustainability in the RMG industries in Bangladesh. Once

the theoretical index is developed, it needs to be tested. To do so, primary data was collected from RMG factories in Bangladesh. Questionnaires were distributed both physically and electronically using Survey Monkey. Target respondents included Officers, Senior Officers and Managers of Human Resource, Production, Procurement and other departments in RMG factories. Besides, two international brands provided their supplier lists which were also exploited to collect data. The researcher physically visited many factories to observe the conditions and collect data. The questionnaire contained two parts: demographic data in the first part, and a sustainability questionnaire in the second part. A total of 238 complete responses were considered for further analysis.

The following table (Table 3) provide the demographic characteristics of the respondents and the factories.

Table 3. Demographic characteristics

Variable		Frequency	Percent
Age of respondent	20–30	28	11.8
	31–40	117	49.2
	More than 40	93	39.1
Product Type	Knit	56	23.5
	Woven	87	36.6
	Knit and woven	79	33.2
	Others	16	6.7
Number of employees	Below 1000	20	8.4
	1000–3000	64	26.9
	3000–5000	83	34.9
	More than 5000	71	29.8

9. Multivariate outlier analysis

To check if any participant is responding differently than other participants in multiple dimensions a multivariate analysis conducted by using Mahalanobis Distance (M-D). Mahalanobis distance can detect any outlier containing extreme scores in two or more variables (Tabachnick and Fidell 2001). By using SPSS regression function Mahalanobis distance is calculated and any individual's having $p<0.001$ is considered as outlier (Tabachnik and Fidell 2001). The result shows that there is no outlier according to the Mahalanobis Distance; this also confirms that there is no careless response (Meade and Craig 2012).

10. Item analysis

For item analysis, an item-total correlation and independent t-test were performed along with Cronbach's alpha. The purpose of conducting these tests was to determine whether any item in the developed scale was inconsistent

with the average value of the set of items. Any value below 0.3 or above 0.8 suggests that the items either did not correlate properly or correlated too well to be accepted (Field 2005). Hence, items showing item-total correlations scores ranging from 0.3 to 0.8 were only considered for further analysis and others were removed. Similarly, items having t-value>2 and p≤0.05 were retained.

After this process, 50 items were left for further analysis. The reliability of the items were measured once again after this process using Cronbach's alpha. At this level, Cronbach's alpha was found satisfactory for all dimensions (0.82≤ α ≥0.90) and sub-dimensions (0.6 ≤ α ≥ 0.87) (Table 4).

Table 4. Reliability measures of dimensions and sub-dimensions

Dimension	No. of Item	α	Sub-dimension	No. of Item	α
Economic Dimension	15	0.90	Risk & Crisis Management	5	0.865
			Compliance	3	0.62
			Supply Chain Management	4	0.60
			Financial Performance	3	0.67
Environmental Dimension	17	0.82	EMS	6	0.70
			Energy Use	5	0.66
			Waste Mgt.	6	0.69
Social Dimension	18	0.85	Labour Mgt.	4	0.80
			Workplace Mgt.	6	0.68
			Stakeholder	8	0.775

11. Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted to examine how well the data fits into the model consists of three dimensions and ten sub-dimensions derived from the theoretical foundation.

CFA conducted on the 50 items were derived from previous steps; the analysis provides following readings: CMIN/df = 5.868; RMR = 0.048; RMSEA = 0.143; CFI = 0.865; TLI = 0.822. It does not provide a proper model fit as the standards were not met.

To examine which items are not consistent with sub-dimensions and dimensions, three separate second order CFA has been conducted for three dimensions by considering items under sub-dimensions as the latent variable. Loading value of the items and model fit are observed to remove the inconsistent items. After this process, 20 items are removed as they show very weak relation with the dimensions. Removed items are Economic Dimension: RCM 1, 2, 3, SCM 5; Environmental Dimension: EMS 3, 5, 6, Energy

Table 5. Results of CFA for 30-Item RMG Sustainability Scale

CMN/df	RMR	RMSEA	CFI	TLI	GFI	AGFI	NFI	IFI	PNFI
1.626	0.021	.051	0.981	0.974	0.959	0.930	0.954	0.982	0.678

3,6, Waste 3, 5, 6; Social Dimension: Labor 6, Workplace 2, 5, 6 and Stakeholder 4, 5, 6, 8.

After all these analyses only 30 items remained and provided following result (Table 5). All the fit indices show model fit. The mean value of the items of each sub-dimension is considered and sub-dimensions are treated as latent variables. Figure 2 shows the sustainability index consisting final 30 items.

Factor loadings of variables are also considered. Items showing factor loading more than 0.4 are only retained for the sustainability index. Items having loading value less than 0.4 are considered as "weak loading" (Deng 2010). However, on final scale no latent variable (sub-dimension) is found to be "weakly" loaded (Table 6).

All of the ten sub-dimensions included in the hypothesized three-dimensional model remained in the finalized model-fit version of the sustainability index. The 30-item sustainability index included 11 items from the Economic dimension (Risk and Crisis Management – 2 items, Compliance – 3 items, Supply chain Management – 3 items and Financial Performance – 3 items), nine items from the environmental dimension (Environment Management System – 3 items, Energy use and Emission to Air – 3 items, and Waste and Wastewater Management – 3 items) and 10 items from the social dimension (Labour Management – 3 items, Workplace Management – 3 items and Stakeholder Engagement – 4 items) (Table 7).

Table 6. Factor Loadings of CFA for 30 Items Sustainability Index

Dimension	Sub-dimension	Loading
Economic Dimension	Risk and Crisis Management	0.671
	Compliance	0.760
	Supply Chain Management	0.685
	Financial Performance	0.712
Environmental Dimension	Environment Management System	0.856
	Energy Use and Emission to Air	0.526
	Waste and Wastewater Management	0.724
Social Dimension	Labor Management	0.916
	Workplace Management	0.649
	Stakeholder Engagement	0.894

12. Reliability of the developed scale

An attempt was taken to confirm the reliability of the developed index. The result of that process is presented here in Table 8.

Cronbach's alpha values of 0.90 or more is considered excellent, 0.80 is considered good and 0.70 is considered as adequate, and values below 0.5 are considered as unreliable and hence, should be avoided (Bentler and Chou 1987).
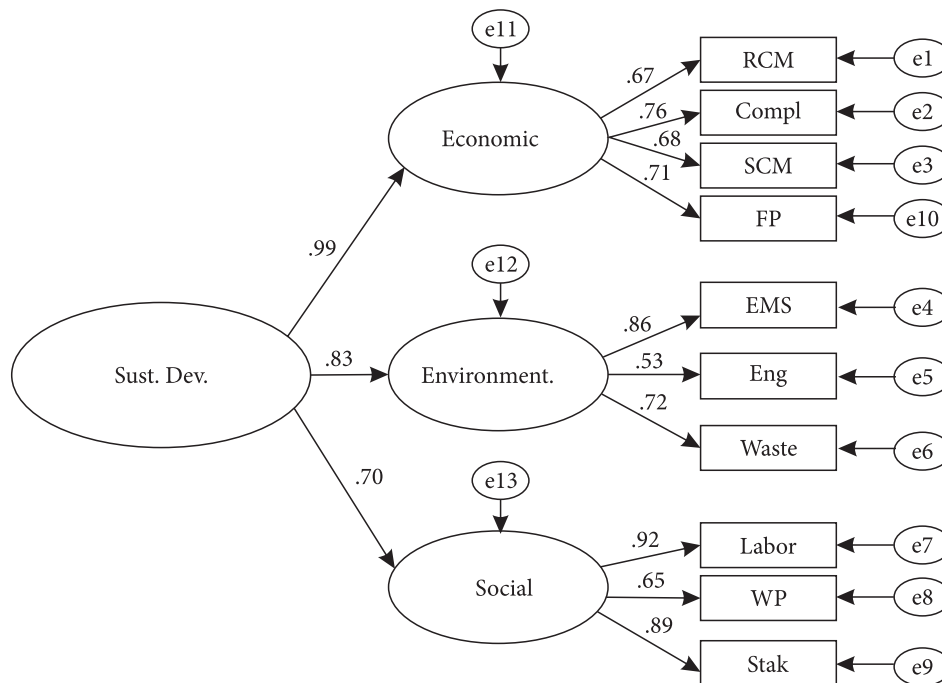

Figure 2. RMG sustainability Index

Table 7. Finalized version of sustainability index

Dimension	Sub-dimension	Item Code	Item
Economic Dimension	Risk and Crisis Management	RCM1	This facility measures continuous improvement in risk management practices through the involvement of employees in a structured feedback process.
		RCM2	This facility has a proper training program in place throughout the organization on risk management principles.
	Compliance	Com1	Corporate codes of conduct have been defined at the facility for corruption & bribery and Money-laundering and/or insider trading/dealing.
		Com2	Responsibilities, accountabilities and reporting lines are systemically defined in all divisions.
		Com3	Dedicated help desks, hotlines and/or complaint boxes are in place.
	Supply chain Management	SCM1	The facility has a formalized process in place to identify sustainability risks in the supply chain.
		SCM2	The facility has taken measures in order to manage sustainability risks amongst your tier 1 suppliers on Environmental and human rights (ILO convention, e.g. forced or child labor, freedom of association) standards for supplier's processes, products or services.
		SCM3	The facility has taken measures in order to manage sustainability risks amongst your tier 1 suppliers on Environmental and human rights (ILO convention, e.g. forced or child labor, freedom of association) standards for supplier's processes, products or services.
	Financial Performance	FP1	The facility experienced significant growth in total revenue during the current year.
		FP2	The facility observed significant growth in Return on Assets (ROA) during the current year.
		FP3	The facility has demonstrated improvement in overall financial performance.
Environmental Dimension	Environment Management System	EMS1	One or more members of management are specifically responsible for environmental management activities.
		EMS2	This facility has been in compliance with all legal requirements/permits during the past 12 months.
		EMS3	This site's environmental management systems certified and/or audited by an independent third party auditor or an accredited internal auditor.
	Energy Use and Emission to air	Eng1	This site calculates and tracks, at least annually, its energy use and greenhouse gas emissions.
		Eng2	This site sets and reviews at least annually improvement targets for reducing energy use (including fuel use for on-site transportation if applicable).
		Eng3	This site has implemented energy conservation or efficiency measures.
	Waste and Wastewater Management	Wst1	This site monitors the quantity and quality of waste and wastewater produced.
		Wst2	This site segregates hazardous and non-hazardous waste and provides training to personnel on handling and segregating waste.
		Wst3	This facility systematically monitors applicable chemical use regulations on a regular basis to ensure compliance and to identify new or changing compliance requirements.
Social Dimension	Labor Management	Lbr1	All workers are provided with a legally recognized, written contract or agreement and an employee handbook and training on the contents of that.
		Lbr2	There is a written policy on employee handbook, formal contract paper, food, and transportation facilities and other benefits.
		Lbr3	There is a written policy on hours of work, days off, overtime hours, grievance procedure, and it applies to all workers in the Facility.
	Workplace Management	WP1	The facility provides means and opportunities for workers to increase health awareness and/or develop life skills and provides free, voluntary and confidential medical screening on an ongoing basis.
		WP2	The Facility has a building construction authentic certification certificate from the agency responsible for authorizing construction in that country with the number of floors authorized in the certificate matching the number of floors that exist in the building today. Furthermore, electrical wiring throughout the Facility is in full compliance with local regulations.

Dimension	Sub-dimension	Item Code	Item
		WP3	The facility has clearly written a policy on health awareness program, risky machine operation training and fire drill.
	Stakeholder Engagement	Stak1	The facility has a policy of engaging with local, regional and international stakeholders to improve working condition and to address issues of concern.
		Stak2	Facility participates in multi-stakeholder or industry forums to develop a full understanding of the risks and challenges in the value chain
		Stak3	Facility engages with key local /regional/international stakeholders to improve working conditions in the value chain.
		Stak4	The facility has implemented innovative community projects that improve the social well-being of workers and their families.

Table 8. Reliability measure of the developed index

Overall Index	No. of Items	Cronbach's α	Dimension	No. of Items	Cronbach's α
Sustainable Development	30	0.925	Economic Dimension	11	0.826
			Social Dimension	10	0.905
			Environmental Dimension	9	0.837

Discussion and conclusions

Although sustainable development is a recent phenomenon, there are a numbers of methods to measure that. However, sustainability still lacks a common way of being measured because of its diverse nature. Some of the methods are widely used but still need improvement. This study is an attempt to fill such a gap in the ready-made garments sector in Bangladesh.

First of all, this study provides a three-dimensional model of sustainability which is supported by widely acceptable corporate sustainability measures. Three dimensions of sustainability in this study are first introduced by Elkington in his TBL (Triple Bottom Line) approach. Elkington (1998) first brought all three aspects of sustainability together to hypothesize the modern measure of sustainability (Jamali 2006). Although the TBL approach is widely accepted and used as a base of the sustainability study, it is quite abstract in nature and difficult to implement (Lozano 2012). It is also failed to set up proper boundaries for reporting which could pose a threat for companies to lose their reputation (Archel et al. 2008). This study tries to remove the difficulties faced by the TBL approach.

Another major benefit of the index developed in this study is it does not focus on certification of sustainability, but rather it helps organizations to measure their actual position in sustainability. As environmental sustainability has become a major concern all over the world, certain certifications have become important when striving for success in business, and ISO is one of them. EMS (Environmental Management System) is used in all environmental sustainability certifications. Using the ISO certification, corporations all over the world report the performance of their responsibilities towards the environment, to stakeholders and the public (Melnyk et al. 2003). But EMS gives the freedom to the companies to measure the environmental impact in their own way (Ahlroth et al. 2011). Moreover, EMS focuses on certain aspects of sustainability rather than as a whole but this index measures all the areas of sustainability.

Corporate Social Responsibility (CSR) plays an important role in the area of social sustainability. Although widely used, no consensus of a common definition has been made yet for CSR. The concept is used differently in the different area of knowledge. This study considers CSR as an important concept and integrates that as a part of social dimension along with other two.

The indicators for the social and environmental dimensions in this study are adopted and modified the Higg index provided by the Sustainable Apparel Coalition (SAC), which is specifically given for the apparel industry. In spite of adding detailed measures for important constructs of the above mentioned two dimensions, the Higg index cannot be fully implemented in the RMG sector in Bangladesh. A lack of instruments/methods to measure certain variables made it unusable for the companies, especially for medium and small ones. Besides, it lacks a holistic view as the economic dimension is not added there. Similar issues were observed in the measures provided by GRI (Global Reporting Initiative). The variables for the Higg index are adopted from the GRI, which includes more indicators for sustainability. This made the GRI too big to handle. To resolve this issue, this index only considered the indicators and items from all three dimensions which could be readily

applicable and easily measurable in the ready-made garments sector in Bangladesh.

Limitations of the study

This study is not beyond limitations. Several limitations observed during the research process are as follows:

First of all, acquiring data was a major limitation for this research. Companies were found to be reluctant to provide data related to the sustainable development to an independent researcher. Some of the areas discussed in this index are considered confidential for companies. Although confidentiality was assured, many factories would not respond to the questionnaire.

Second, there are several types of factories in RMG sector of Bangladesh; some are direct suppliers to the brands (Tier 1), and others are simply 'sub-contractors. In such situations, it is hard to generalize as these organizations have different compliance and management styles. The focus of this study is only Tier 1 factories, which are half of the total RMG factories in Bangladesh.

Third, the questionnaire in this research adopted a five-point Likert scale which was purely based on the perception of the respondent. Although this is a widely used and acceptable measure, some questions in the questionnaire deserved more detail and/or quantitative answers.

Fourth, this study adopted a deductive approach of item generation which limits the freedom of adding items beyond the prescribed definitions. As the definitions of dimensions and variables were adopted from existing literature, it is difficult to add new phenomena in the industry beyond the previous research.

Finally, this index does not provide a detail measure for the companies to acquire certification; rather it is aimed to help them to primarily assess their position in terms of sustainable development.

Future research

Further research is needed to address the above mentioned issues and to replicate the developed index of this study.

To avoid data collection difficulties, research should be conducted with the collaboration of government agencies and international brands. Although some organizations are working on it, a combined effort should be given to overcome the hurdles. Such collaboration may also educate responsible employees to help do the research effectively.

Other approaches of research should be considered to conduct such studies which include, but are not limited to, quantitative research other than the Likert scale, qualitative fact findings by interviewing CEOs, and inductive approaches of item generation.

Research in sub-contract factories is badly needed to understand the reasons for such malpractice and to propose solutions. A mishap in such factories may ruin the reputation of the whole industry.

The developed item for the RMG industry in Bangladesh should be tested in other related industries such as tanneries, shoes and so on. Moreover, major RMG supplier countries should replicate this to test these developed measures.

Conclusions

The ready-made garments sector has become the lifeblood of Bangladesh's exports. Besides, huge numbers of people are employed there; a statistic showed that about 18 to 20 million people earn their livings from this sector, both directly and indirectly (Bhuiyan 2013). With lack of sustainable practice, very often factories in this industry face unavoidable adverse situations such as employee unrest, accidents, high turnover, low productivity, and so on, which eventually bring financial and reputational loss.

Making a sustainable business strategy and practising that is urgent at this point for the factories in that industry. The sustainability index developed in this research will help all the interested parties including the government, factory owners, business associations and international buyers, to assess and monitor sustainable development in this sector.

The developed index in this study could be used as a base for similar scales in other industries. The proper use of this index could help RMG factories in Bangladesh to overcome the difficulties they face in regard to sustainability.

Author contributions

Both MAS and KS conceived the study and were responsible for the design and development of the data analysis. MAS was responsible for data collection and both MAS and KS were responsible for data analysis. MAS and KS were responsible for data interpretation.

Disclosure statement

We, Md Abdus Salam and Kalayanee Senasu-authors of this paper, declare that there is no competing financial, professional, or personal interest from other parties to conduct this study.

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APPENDIX

Notations

Abbreviations
AMOS – Analysis of Moment Structures
BGMEA – Bangladesh Garment Manufacturers and Exporters Association
CFA – Confirmatory Factor Analysis
CMin/df – Minimum Discrepancy
CSR – Corporate Social Responsibility
DIFE – Department of Inspection for Factories and Establishment, Bangladesh
EMS – Environmental Management System
GATT – General Agreement on Tariff and Trade
GRI – Global Reporting Initiative
IOC – Item Objective Congruence
ISO – International Organization for Standardization
RMG – Ready-made Garments
SD – Sustainable Development
TBL – Triple Bottom Line
UN – United Nations