

# What Makes Bangladeshi RMG Suppliers Resilient in Global Apparel Supply Chain Management?

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## **Author's contribution**

*The sole author designed, analyzed, interpreted, and prepared the manuscript.*

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## **ABSTRACT**

The global Readymade Garments (RMG) industry heavily relies on global supply chain management that aims to seek suppliers offering affordable, high-quality products delivered quickly. However, research on the factors influencing supplier selection in the RMG sector is scarce, and existing models fail to explain the paradox of rising exports in Bangladesh despite supply chain disruptions. This research strived to pervade this knowledge gap through a mixed-method empirical study on 66 international clothing brands. The findings reveal a two-step supplier selection process involving enlistment in a qualified supplier pool and subsequent allocation of work orders within the pool. Supplier competence and competitiveness are critical for enlistment and order qualification, while supplier relationship, competitiveness, and competence influence the selection of order winners. Notably, larger companies prioritize relationships in supplier selection. International RMG buying companies should focus on supplier competence factors to mitigate supply chain risks and maintain positive public relations. For the same reason, Bangladeshi policymakers should enforce compliance and help RMG suppliers to gain competencies.

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## 1. INTRODUCTION

Global supply chain management is a current buzz in the industry and academic sector. This global operation's success mainly lies in the effectiveness of managing the global supply chain. For most companies, the global supply chain is now a source of competitive advantage [1]. However, choosing suitable suppliers has always been challenging in global supply chain management.

The risk of supplier selection mostly evolved from the significant differences prevailing in the global circumstances, such as those related to lead times, tariffs, non-tariff trade barriers, local cultural norms, languages and practices, worker skills, supplier quality, equipment and technology, telecommunications, and exchange rates, not only make decisions more challenging but also reduce the effectiveness of supply chains [2]. Thus, risk-adjusted supply chain management can only achieve improved financial performance and competitive advantage [3]. Various globalization strategies are available to a company to minimize the risks inherent in managing the global supply chain [4], such as outsourcing and offshoring. Furthermore, firms make sourcing choices that optimally position the firm to minimize cost, improve quality, and foster productivity and performance [5].

One of the famous destinations for RMG outsourcing is Bangladesh, which holds the second-largest RMG exporter position after China. In 2010, Bangladesh became the second largest RMG exporting nation by exporting about 18 billion dollars of readymade garments [6]. The RMG sector of Bangladesh is the most significant (approx. 82% of the total export) foreign currency earning sector, which has approximately 248 International brands and 200 buying houses [7,8] and employs nearly 5 million workers (90% are women [9]) in about 6,393 garments manufacturing factories [10,11]. Bangladesh's RMG sector adds value through the cutting-sewing-packaging process. Domestic value addition for knit products is about 75% of the entire process. Bangladesh export both knit and woven items around the world.

Although global supply chain management has become a common phenomenon in today's world and outsourcing has been highly practiced among different industries since the 1980s,

researchers have long overlooked factors affecting outsourcing supplier selection in the RMG sector. For example, a group of researchers [12–23] have developed and used different models to identify the best supplier rather than focusing on effective criteria, let alone the specific area such as RMG.

Moreover, the possible consequences of supply chain risks may have catastrophic effects on companies [24]. When a supply chain is disrupted, the outsourcers tend to move to a different location or supplier, as Hendricks & Singhal [25] have found that companies suffer (their stock value declines about 40%) a lot from supply chain disruption. Furthermore, recovery takes a long period from the effect of disruption [26]. However, the paradox is that despite, on average 148 workers being killed in suppliers' factories [27–29] for the different incidents and the RMG supply being disrupted; still, the international brands sourcing from Bangladesh and the export of RMG from Bangladesh are increasing.

The available literature may help an academician and practitioner identify the better supplier, but it needs to explain the Bangladeshi RMG export growth mystery. Identifying the factor affecting supplier selection in RMG outsourcing may unlock the mystery and increase academic knowledge regarding the salient RMG supplier determinants. To address these research problems, the following are the goals of this study.

### 1.1 Objectives

The prominent theories (AHP, Fuzzy-AHP, TOPSIS, ANP, Fuzzy ANP, DEMATEL, and others) on supplier selection are mostly methodologies to identify suitable suppliers based on some criteria set by respective researchers or practitioners. However, industry-specific supplier selection criteria have become a vital element in selecting the right supplier, which appeared as one of the crucial factors for organizational performance, competitive advantage, and attaining strategic goals at low risk [30–34]. For this essential cause, this research aims

- i. To identify the items/factors relevant to supplier selection in RMG outsourcing of global supply chain management.

- ii. To examine the role of company size and origin in selecting suppliers for RMG outsourcing.

## 2. METHODOLOGY

Applying a structured decision-making process with qualitative and quantitative factors is essential for supplier selection [35], especially in complex situations [36]. A multi-method approach (qualitative and quantitative), a common trend in supply chain / logistic research [37], has been undertaken. At first, through a literature review, the quantitative survey instrument was developed to test the relationship between the variables. Then, qualitative interviews were conducted to elaborate and refine the quantitative results.

### 2.1 Constructs and Model

Supplier selection criteria identified in the previous research of supplier selection methodologies have been grouped into three constructs: Competitive Factors, Competence Factors, and Relationship Factors. These

constructs are the Independent variables. The Selection construct is the dependent variable, which includes the items: level of satisfaction with the supplier and the future commitment to outsourcing from the concerned supplier. Customer satisfaction with the supplier directly determines customer loyalty, a key factor in determining customer retention [38]. Consumer retention may be achieved by a) continuing the purchase contract and b) future purchase commitment [39]. In addition, the company size and origin of the buyers have been used as moderator variables. These items and the constructs are given in Table 1.

Both primary surveys and Fu et al. [40] suggest that suppliers are chosen first for the qualified pool then order allocation is done among the qualified suppliers. Because order winner criteria are not identical to order qualifiers [41,42], this study divided the hypotheses based on supplier selection/order qualifying criteria and order winning criteria. The following are the hypotheses of factors affecting the selection of a supplier of RMG as a qualifier and order winner.

**Table 1. Items used in the construct for supplier selection**

Construct	Items	
Competence	COMT1	Capacity
	COMT2	Certification*
	COMT3	Compliance*
	COMT4	Efficiency*
	COMT5	Environmental Practices
	COMT6	Financial Soundness*
	COMT7	Management Quality
	COMT8	Testing Facility*
Relationship	RE1	Communication Skill / Culture understanding
	RE2	An ongoing relationship with the existing buyer
	RE3	Relationship with other international buyers*
	RE4	Reliability
	RE5	Reputation
Competitiveness	COM1	Cost
	COM2	Flexibility
	COM3	Innovations
	COM4	Lead-time
	COM5	Product Quality
	COM6	Skilled labor*
	COM7	Technology
Selection	S1	Future Commitment
	S2	Satisfaction

\* Added based on expert opinion and pilot study

- **Competence Factor**

Competence factors include capacity, certification, compliance, efficiency, Environmental practices, financial Soundness, management quality, and having a testing facility. These items are included in the competency because suppliers need to meet these basic requirements for selection identified in other previous research [14,43–46]. Thus, the following hypotheses can be made:

H<sub>1a</sub>: *Competence factors influence the supplier selection as an order qualifier to a buyer for RMG outsourcing.*

H<sub>1b</sub>: *Competence factors influence the supplier selection as an order winner to a buyer for RMG outsourcing.*

- **Competitive Factors**

The competitive factors include cost or price, flexibility, innovations, lead time, product quality, skilled labor, and technology. Cost is one of the most critical factors directly impacting supplier selection in global supply chains [47]. For basic apparel, Jin & Farr [48] found that cost was the essential criterion in selecting suppliers, followed by lead time, quality, and technology. Because the quality of garment products also influences buyers' perception, a global supply chain must prioritize high product quality [47]. Thus, the following hypothesis can be made:

H<sub>2a</sub>: *Competitiveness factors influence the supplier selection as an order qualifier to a buyer for RMG outsourcing.*

H<sub>2b</sub>: *Competitiveness factors influence the supplier selection as an order winner to a buyer for RMG outsourcing.*

- **Relationship**

It refers to the integrity of the supplier based on past performance and honesty in fulfilling supply chain activities[49]. The relationship factors include the ongoing relationship with existing and other international buyers, reliability, reputation, communication skills, cultural understanding, and standing in the industry. Recent studies by Li et al. [50] has found that both informal (*guanxi*) and formal relationship between supplier and buyers help to gain superior outsourcing performance and manage conflict in China, the most prominent outsourcing destination. Where the buyers are more dependent on the suppliers, the relationship can help to build trust and remove

vulnerability [51]. The more dependability, the more the need to make the relationship and, thus, the more chances that the supplier will get the order [21,52]. Therefore, the following hypothesis can be made:

H<sub>3a</sub>: *Relationship factors influence the supplier selection as an order qualifier to a buyer for RMG outsourcing.*

H<sub>3b</sub>: *Relationship factors influence the supplier selection as an order winner to a buyer for RMG outsourcing.*

- **Moderating Factors**

Company origin sometimes influences supplier selection [17,53]. Therefore, this study tried to include another variable company size identified in the qualitative research to see whether international company size (annual sales) impacts the selection of suppliers. Thus, the following hypotheses can be made:

H<sub>4a</sub>: *The influence of Competence factors on the selection of a supplier as an order qualifier to a buyer for RMG outsourcing is moderated by company size.*

H<sub>4b</sub>: *The influence of Competence factors on the selection of a supplier as an order qualifier to a buyer for RMG outsourcing is moderated by company origin.*

H<sub>4c</sub>: *The influence of Competence factors on the selection of a supplier as an order winner to a buyer for RMG outsourcing is moderated by company size.*

H<sub>4d</sub>: *The influence of Competence factors on the selection of a supplier as an order winner to a buyer for RMG outsourcing is moderated by company origin.*

H<sub>5a</sub>: *The influence of Competitive factors on the selection of a supplier as an order qualifier to a buyer for RMG outsourcing is moderated by company y size.*

H<sub>5b</sub>: *The influence of Competitive factors on the selection of a supplier as an order qualifier to a buyer for RMG outsourcing is moderated by company y origin.*

H<sub>5c</sub>: *The influence of Competitive factors on the selection of a supplier as an order winner to a buyer for RMG outsourcing is moderated by company size.*

H<sub>5d</sub>: *The influence of Competitive factors on the selection of a supplier as an order winner to a buyer for RMG outsourcing is moderated by company y origin.*

H<sub>6a</sub>: *The influence of Relationship factors on the selection of a supplier as an order qualifier to*

a buyer for RMG outsourcing is moderated by company size.

H<sub>6b</sub>: The influence of Relationship factors on the selection of a supplier as an order qualifier to a buyer for RMG outsourcing is moderated by company origin.

H<sub>6c</sub>: The influence of Relationship factors on the selection of a supplier as an order winner to a buyer for RMG outsourcing is moderated by company size.

H<sub>6d</sub>: The influence of Relationship factors on the selection of a supplier as an order winner to a buyer for RMG outsourcing is moderated by company origin.

Based on the hypotheses, Fig. 1 shows the supplier selection/ordering model for RMG outsourcing.

## 2.2 Questionnaire Design

This study adopted a cross-sectional survey with self-completion close-ended questionnaires administered to participants to achieve a higher response rate. The questionnaire for this study has interviews in four parts. The first section gives an overview of the survey and takes respondents' ethical consent about the study. The second section includes four demographic questions: the company's origin, how long they

have been outsourcing, company turnover (sales), and product type, and the last section asks the question about the variables determining the supplier to offer RMG outsourcing orders. Each variable consisting of a 5-point Likert scale was applied in the questionnaire to convey a level of intensity and feeling to the respondent to express their opinion without confusion.

Pre-testing was done before the final distribution to determine the validity of the questionnaire's contents. Also, a Pilot-test was undertaken with about ten respondents to test the reliability of the survey questionnaire. Finally, suggestions and observations from pre-test and pilot tests were evaluated based on the rationale, validity, and reliability. After the screening, the most appropriate recommendations and comments were included in the questionnaire.

## 2.3 Sample and Sampling

In Bangladesh, there is about 200 local buying house [54], 29 American ABWS brands [8], and 219 AFBSB member brands [7] outsourcing from Bangladesh. These 248 international brands either outsource directly through the local liaison office or the local 200 buyers. For simplicity, this study only considered original brands rather than buying houses.

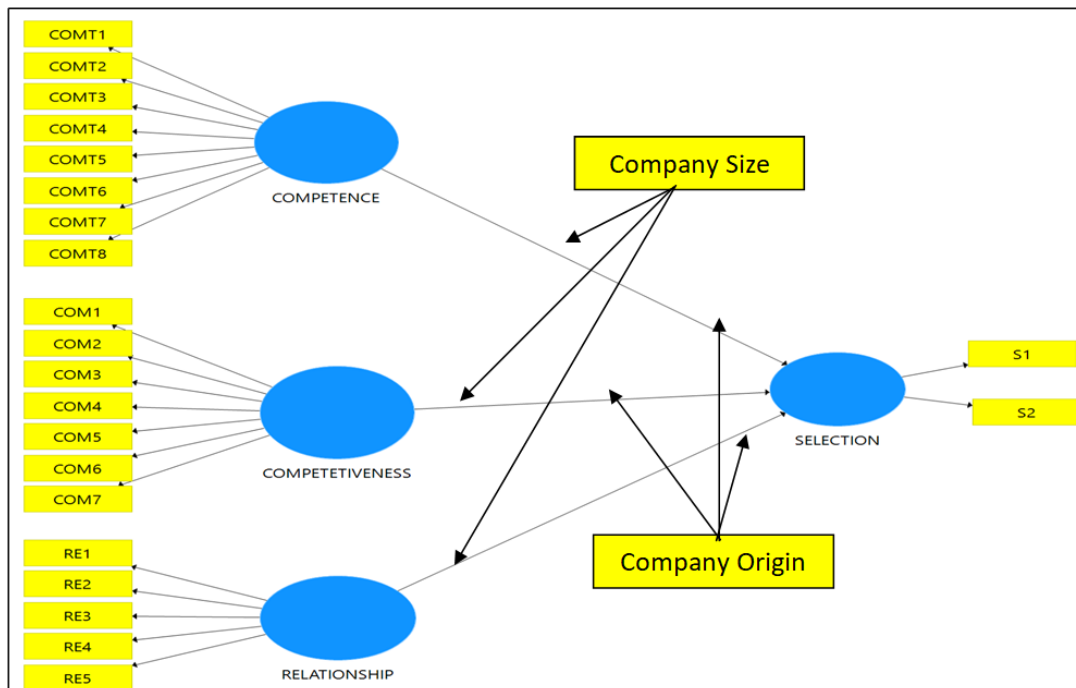


Fig. 1. Proposed model for selection/ordering of supplier for outsourcing RMG

For a reliable study, this study requires a minimum of 91 samples to conduct data analysis with PLS-SEM [55–64]. However, for a greater response rate, 135 respondents (merchandise) were chosen by applying snowball sampling [65,66] from 66 international brands considering the historically low response rate of companies [17,67].

The study distributed 135 questionnaires, all returned due to the direct face-to-face method, which eliminates non-response bias [68]. However, 35 questionnaires were discarded for incompleteness (intentionally left unanswered for company secrecy), and single-value response on the Likert scale. Thus, there were 100 questionnaires for further analysis based on the PLS-SEM method using SmartPLS 3.3 [69,70] software.

### 3. LITERATURE REVIEW

A suitable supplier selection procedure is essential to the smooth operation of the global supply chain in today's competitive environment. Selecting the right supplier is challenging for the manager responsible for purchasing. For most companies, the purchases of services and goods make up 70 percent of the product costs [71]. Therefore, choosing the correct supplier is crucial to the procurement process and offers great potential for firms to cut costs, profitability, and cash flow [72]; choosing the wrong supplier can cause financial and operational problems [73]. Moreover, companies are enormously dependent on suppliers due to outsourcing, making it more crucial to select better-performing suppliers [74].

However, supplier selection is a complicated process [72,75] where the decision-makers have to deal with conflicting objectives optimization such as delivery time, costs, and quality. As a result, global brands have to make a trade-off at every stage of the supply chain [76].

Several multi-criteria decision-making solutions are available for these problems [75,77,78] to resolve the supplier selection trade-off problem. Based on the purchasing scenarios, the criteria have diverse necessities, and evaluation is demanded [79]. Multi-criteria decision-making methods support decision-makers in analyzing these available alternatives [75]. Some popular multi-criteria supplier selection models are Analytic Hierarchy Process [80], Fuzzy-AHP Method [81], Fuzzy AHP, Technique for Order

Preference by Similarity to Ideal Solution [82], The Analytic Network Process [83], Fuzzy ANP [84], DEMATEL [85], Fuzzy DEMATEL [86], Grey-DEMATEL [87], ANP-DEMATEL [88] and AHP-MAUT [89], hybrid rough-fuzzy DEMATEL-TOPSIS [34] have applied in selecting a supplier.

However, these models of supplier selection mentioned earlier are primarily based on methodology rather than criteria selection. Properly selecting the supplier criteria that apply to a particular context will make the result driven by these methods ear and usable for practical application.

The first-tier supplier accounts for 58% of supply chain disruptions, and suppliers are the companies' number one worry [90]. Therefore, industry-specific supplier selection criteria have become a vital element in selecting the right supplier, which appeared as one of the crucial factors for organizational performance, competitive advantage, and attaining strategic goals at low risk [30–33]. For this essential cause, this research will identify the items/factors relevant to supplier selection in RMG outsourcing of global supply chain management.

Su, Dyer, & Gargeya [91] found that strategic sourcing (a way of acquiring manufacturing capabilities without making capital commitments, such as outsourcing) substantially impacts business performance, and supplier selection significantly impacts a company's ability to gain competitive advantages. Supplier selection is crucial for establishing the supply chain, but several elements influence the choice of suppliers [92].

Global supply chain management is recently changing its focus from competition to collaboration. Thus, the evolving relationship between enterprise and supplier is changing from vendor to preferred supplier to exclusive supplier and partner [93]. Large textile and clothing companies typically employ various sourcing techniques to minimize costs and reduce risk while building strong connections between buyers and suppliers.

The current trend in global sourcing makes it challenging for textile and clothing companies to perform regular on-site supplier evaluations. Therefore, as part of their SCM operations, businesses need to have a successful procedure for choosing and evaluating suppliers [49].

**Table 2. Supplier determinants**

<b>No.</b>	<b>Factors</b>	<b>Authors</b>	<b>Frequency</b>
1	Product Quality	Dickson [96]; Cusumano & Takeish [97]; Weber & Current [22]; Chaudhury et al. [98]; Swift [21]; Jayaraman et al. [99]; Lee et al. [100]; Muralidharan et al. [101]; Muralidharan et al. [102]; Sarkis & Talluri [103]; Chan [104]; Prahinski & Benton [105]; Kreng & Wang [106]; Teng & Jaramillo (87); Pi & Low [107]; Chang et al. [108]; Su et al. [91]; Milecova et al. [52]; Jin & Farr [17]; Sawik [109]; Gupta et al. [72]	22
2	Price / Cost	Dickson [96]; Cusumano & Takeish [97]; Weber & Current [22]; Chaudhury et al. (1993); Swift [21]; Choi & Hartley [110]; Lee et al. [100]; Muralidharan et al. [102]; Sarkis & Talluri [103]; Chan [104]; Prahinski & Benton [105]; Teng & Jaramillo [49]; Kreng & Wang [106]; Pi & Low [107]; Chang et al. [108]; Su et al. [91]; Milecova et al. [52]; Jin & Farr [48]; Sawik [109]; Yücenur et al. [47]; Upadhyayula et al. [46];	21
3	Fulfillment of deadlines / Delivery/ Lead-time	Dickson [96]; Cusumano & Takeish [97]; Chaudhury et al. [98]; [22]; Jayaraman et al. [99]; Lee et al. [100]; Muralidharan et al. [101]; Muralidharan et al. ([102]; Sarkis & Talluri [103]; Chan [104]; Prahinski & Benton [105]; Teng & Jaramillo; Pi & Low [107]; Kreng & Wang [106]; Su et al. [91]; Milecova et al. [52]; Jin & Farr [17]; Sawik [109]	18
4	Quality of Management / Service	Choi & Hartley [110]; Lee et al. [100]; Muralidharan et al. [101]; Sarkis & Talluri [103]; Chan [104]; Prahinski & Benton [105]; Pi & Low [107]; Chang et al. [108]; Milecova et al. [52]; Yücenur et al. [47]; Gupta et al. [72]; Hsu et al. [14]	11
5	Flexibility	Choi & Hartley [110]; Muralidharan et al. [101]; Sarkis & Talluri [103]; Chan [104]; Prahinski & Benton [105]; Teng & Jaramillo [49]; Milecova et al. [52]	7
6	Technology Used	Cusumano & Takeish [97]; Choi & Hartley [110]; Muralidharan et al. [101]; Milecova et al. [52]; Sarkis & Talluri [103]; Chan [104]	6
7	History of Relationship/ Experience / Past Performance	Cusumano & Takeish [97]; Swift [21]; Choi & Hartley [110]; Sarkis & Talluri [103]; Muralidharan et al. [101]; Chan [104]	6
8	Environmental Practices & Sustainability	Gauthier [111]; Klassen & Whybark [112]; Dou & Sarkis [44]; Hsu et al. [14]; Gupta et al. [72]	5
9	Capacity	Jayaraman et al. [99]; Milecova et al. [52]; Sawik [109]	3
10	Reliability / Dependability / Trust	Swift [21]; Choi & Hartley [110]; Teng & Jaramillo [49]; Su et al. [91]	3
11	Goodwill /Reputation / Characteristics	Milecova et al. [52]; Yücenur et al. [47]; Gupta et al. [72]	3
12	Language skills and cultural	Milecova et al. [52]; Yücenur et al. [47]	2

<b>No.</b>	<b>Factors</b>	<b>Authors</b>	<b>Frequency</b>
	understanding		
13	Finance	Choi & Hartley [110]; Muralidharan et al. [101]	2
14	Innovations	Sarkis & Talluri [103]; Chan [104]	2
15	Stability/ Consistency	Choi & Hartley [110]; Milecova et al. [52]	2
16	References	Milecova et al. [52]	1
17	Complexity of services	Milecova et al. [52]	1
18	Usability	Swift [21]	1
19	Response	Chang et al. [108]	1

*Source: Bai & Sarkis [113], Chang & Hung [92]*



Leenders, Fearon, Flynn, & Johnson [94] asserted that suppliers are selected based on the buyer's assessment of their capacity to satisfy the quality, quantity, delivery, pricing, and service requirements. However, these criteria are conflicting [95] and there is always a trade-off between risk, penalty, and expenditure [40].

In the apparel industry, make-to-order environment [93], supplier selection responsibility ultimately lies with the merchandising managers. Meixell & Gargeya [2] suggested including enough supplier tiers to allow the investigation to enhance supply chain managers' capacity to combine decisions and coordination within the tier. Factors identified or used by the previous researchers are summarized below in Table 2, including the frequency.

The competitive advantages of the Bangladesh RMG sector are price, capacity, and capability [114–118]. For example, compared to the USA, Bangladesh can produce a Polo T-Shirt 65% cheaper than the USA. There are enough savings in every aspect of production, for which the global apparel industry and USA per se moved for outsourcing in the 1950s [29].

Bangladeshi suppliers can offer lower prices due to the cheap labor available in Bangladesh. The average monthly wage for an RMG worker in Bangladesh is about \$68 compared with \$280 in China, the world's biggest clothes exporter [119]. However, ILO [120] reported that Bangladeshi RMG workers get the second-lowest minimum wages in the world after Sri Lanka.

Moreover, the RMG industry is highly labor-intensive [120]. The abundance of supply or cheap labor suits the labor-intensive RMG sector's need for labor. Bangladesh employs about 5 million workers (90% are women [9] in approximately 6,393 garment manufacturer factories [10,11], which is ahead of the South Asian countries in terms of capacity [116]. Regarding capability, Bangladeshi RMG suppliers are very focused; they are branded for delivering excellent quality apparel of bulk order sizes for the lower mid-market.

In addition to price, capacity, and capability, Bangladesh is preferred by the RMG buyers for favorable trade agreements such as MFA & GSP, duty-free import, two-stage processing, and balanced sourcing of product portfolio [114,116–118,121,122].

Lead-time in the RMG industry is considered the duration from order receipt to shipment of goods to the buyers - termed as manufacturing lead-time, part of the buyers' global supply chain lead-time. Therefore, RMG manufacturers need to calculate the lead time at five points in the supply chain [123], including order processing time, procuring and manufacturing time, and transporting time between the different phases of the supply chain [124].

In the RMG industry, buyers want short lead-time and affordable prices [125]. Their input for producing apparel can categorize the average lead time of RMG factories. First, the Full Composite Factories import cotton, taking 90-110 days to finish the process. Second, Knit Composite factories outsource yarn domestically or internationally and take about 70-90 days to complete the process. Third, Woven Apparel Factories outsource fabric domestically or internationally and take about 120 days to complete the process. It takes about 40-60 days for importing cotton, yarn, or fabrics to reach the factory for further processing. The biggest competitor of Bangladesh, China's average lead time is only 40 days, followed by India's and Pakistan's lead time of 45-60 [124]. However, except for foreign procurement, RMG processing time for Bangladesh is about the same 30-60 days as China, India, and Pakistan.

Bangladesh needs to catch up to China, India, and Pakistan in labor productivity. According to a study by McKinsey, which took the productivity of Chinese workers as a base (100%), Bangladeshi workers are found to be 77%, India's workers are found to be 92%, and Pakistani workers are found to be 88% productive [116]. However, to achieve the 50 billion dollar export goal, the productivity of Bangladeshi workers needs to be increased significantly [126].

Ferdous[127] argued that less productivity is derived from workers' dissatisfaction, which results in a shortage of skilled workforce. However, he also found that improving the six areas (medical facility, canteen facility, well-behaved supervisor, working environment, one-time salary, benefit payment, and adequate wages) can increase the productivity of RMG workers.

Bangladeshi RMG factories are characterized by a lack of a safe working environment, the use of child labor, a lack of incentives from key stakeholders, and insufficient programs for

developing human resources [128]. The reason behind the poor working condition is that Bangladeshi manufacturers are forced to operate on tight profit margins, often encouraging them to cut corners. These cost-saving techniques often include subcontracting work to other factories and slashing safety [129,130]. Although corporate giants are often aware of the poor or even sweatshop conditions of RMG factories, they turn a blind eye to it and deny responsibility if anything happens [15,29,131]. The buyers sanely weigh the prevailing hazardous working conditions against the advantages of the Bangladeshi suppliers' competitive prices, capacities, and capabilities.

An opinion study on garment workers [115] found that 82% of the respondents work more than 10 hours daily, 98% do not get any weekends, and about the same amount of respondents reported working in an unsecured factory. Consequently, several accidents occurred, including the world's worst RANA PLAZA accident [27–29].

However, there is a paradoxical situation prevailing in Bangladesh. International brands continue to import from Bangladesh despite many incidents, such as child labor, political unrest, labor unrest, factory accidents, and poor governance [132]. However, Hendricks & Singhal [25] have found that companies suffer (their stock value declines about 40%) a lot due to supply chain disruption, and it takes a long time to recover from the disruption effect. As a result of the RANA Plaza crash, the world's top apparel brands, such as Walmart, suffered supply chain disruption and public relations crises [29]. Moreover, multinational apparel companies are under intense scrutiny by their customers, employees, GOs, and NGOs on the sustainability of their operations and performances [15].

The brands might have shunned sourcing from Bangladeshi suppliers of RMG. But, the opposite happened, and there might be some mystical issues here in the Bangladeshi RMG sector. F. Z. Ahmed et al. [132] has analyzed this paradoxical situation and argued that an increase in China's labor costs [29], positive outlook of the industry stakeholders, improved living standard for the worker and competitive environment, improved managerial capabilities of the second generation garment owners propelled the growth of RMG sector in Bangladesh despite the weak governance and tragedies. However, a systematic study has yet to be done to identify

the factors influencing the selection of suppliers for RMG outsourcing. Therefore, this study tried to fill this knowledge gap by empirically identifying the factors that make the Bangladeshi RMG suppliers resilient.

## 4. DATA ANALYSIS AND FINDINGS

### 4.1 Supplier Qualifying Factors for RMG Outsourcing

#### 4.1.1 Measurement model of supplier qualifying factors for RMG outsourcing

The measuring model was evaluated for all constructs' internal reliability, convergent, and discriminant validity. Fig. 1 shows the measurement model for supplier qualifying factors for RMG outsourcing.

**Reliability:** Cronbach's alpha and composite reliability are used to assess reliability; a level of 0.70 indicates adequate internal consistency. All the constructs in Table 3 have Cronbach Alpha and composite reliability values of more than 0.742, above the suggested value. Consequently, the constructs were found to have appropriate reliability.

**Validity:** The validity is assessed from two dimensions: convergent validity and discriminant validity. When measuring constructs with an average variance extracted (AVE) of at least 0.50 and item loading is substantially over 0.50 and larger than other constructs loading, convergent validity is considered satisfied [133]. Table 3 shows that the average variance extracted (AVE) values are above 0.50, and the item loading values in Table 4 are above 0.70 and larger than other constructs' loading. Thus, the prerequisites for convergent validity were satisfied.

The discriminant validity is calculated using the AVE (Fornell-Larcker Criterion) square root, cross-loading matrix, and Heterotrait-Monotrait Ratio (HTMT) ratio. The square root of a construct's AVE and cross-loading items must have greater correlation values with items of own constructs than those of other constructs, respectively, for satisfactory discriminant validity [134]. For HTMT ratio criteria, the construct must have a ratio below 0.90 with other constructs under consideration to satisfy the discriminant validity. Table 5 represents Fornell-Larcker Criterion, and Table 6 illustrates HTMT ratios. All of these tables show that constructs and items have good discriminant validity.

**Table 3. Measurement model for supplier selection as an order qualifier**

Constructs	Cronbach's Alpha	Composite Reliability	Average Variance Extracted(AVE)
Competence	0.866	0.894	0.512
Competitiveness	0.863	0.895	0.548
Relationship	0.842	0.888	0.614
Selection	0.742	0.886	0.795

**Table 4. Item cross-loading for supplier selection as an order qualifier**

Items	Competitiveness	Competence	Relationship	Selection
COM1	0.723	0.484	0.402	0.384
COM2	0.736	0.573	0.484	0.527
COM3	0.758	0.420	0.483	0.542
COM4	0.732	0.510	0.287	0.490
COM5	0.742	0.629	0.526	0.491
COM6	0.761	0.368	0.482	0.389
COM7	0.729	0.547	0.505	0.607
COMT1	0.503	0.713	0.368	0.526
COMT2	0.575	0.706	0.369	0.320
COMT3	0.451	0.720	0.294	0.358
COMT4	0.419	0.721	0.295	0.364
COMT5	0.470	0.730	0.392	0.555
COMT6	0.496	0.731	0.509	0.428
COMT7	0.491	0.705	0.387	0.415
COMT8	0.567	0.701	0.421	0.355
RE1	0.420	0.409	0.708	0.407
RE2	0.490	0.346	0.772	0.336
RE3	0.444	0.463	0.806	0.465
RE4	0.481	0.355	0.781	0.384
RE5	0.585	0.494	0.844	0.412
S1	0.604	0.518	0.465	0.890
S2	0.604	0.553	0.458	0.893

**Table 5. Fornell-larcker criterion for supplier selection as an order qualifier**

Constructs	Competence	Competitiveness	Relationship	Selection
Competence	0.716			
Competitiveness	0.689	0.740		
Relationship	0.534	0.617	0.783	
Selection	0.600	0.678	0.517	0.891

**Table 6. Heterotrait-monotrait ratio (HTMT) for supplier selection as an order qualifier**

Constructs	Competence	Competitiveness	Relationship	Selection
Competence				
Competitiveness	0.790			
Relationship	0.613	0.719		
Selection	0.721	0.826	0.648	

**Test for Common Method Bias (CMB):** Firstly, using SPSS, Harman’s single-factor test has been performed on all of the first-order indicators using exploratory, unrotated factor analysis. The test produced 22 distinct factors, the most

significant factor accounting for just 41.294 percent of the variance of the model. The outcome is less than the threshold of 50% or above. Secondly, the correlation matrix was used to determine whether the indicators have a

correlation value greater than 0.90, which indicates that the data have CMB. The correlation coefficients for all indicators were all less than 0.90. Thus, our data is unlikely to exhibit common method bias, according to both tests (CMB).

**4.1.2 Structural model for supplier qualifying factors for RMG outsourcing**

The structural model facilitates to capture of the path relationships among the constructs and accesses the connection for statistical significance through the VIF, R<sup>2</sup>, f<sup>2</sup>, Q<sup>2</sup> path coefficient (β), p-value, and t-statistics.

**Collinearity Statistic (VIF):** Table 7 shows the VIF values of all combinations of endogenous constructs (represented by the columns) and corresponding exogenous (i.e., predictor) constructs (represented by the rows). As seen in Table 7, all the VIF readings are well below the five (threshold value). As a result, collinearity among predictor constructs is a minor concern in the structural model.

**Path Coefficient:** Table 8 presents the path coefficient of the structural model for supplier qualification determinants for outsourcing RMG. Table 8 shows that Competence (β = 0.229, t = 2.224, and p = 0.027), Competitiveness (β = 0.446, t = 4.244, and p = 0.000) had a significant effect on supplier selection as a qualifier,

whereas, Relationship (β = 0.120, t = 1.266, and p = 0.206) had no significant effect on selection as a qualifier. Therefore, H<sub>1a</sub> and H<sub>2a</sub> were supported among the hypothesis, whereas H<sub>3a</sub> was not supported.

**R Squared (R<sup>2</sup>):** The endogenous latent variable R<sup>2</sup> value has been examined, and the outcome indicates that the R<sup>2</sup> value of the selection (0.502) can be considered moderate following the rule of thumb [135].

**Effect Size (f<sup>2</sup>):** The effect size (f<sup>2</sup>) values enable the assessment of an endogenous construct's contribution to the R<sup>2</sup> value. The f<sup>2</sup> value of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively; however, any value less than 0.02 represent no effect [55]. Table 9 shows competence (0.053), competitiveness (0.175), and relationship (0.017) constructs have a small, medium, and no effect size, respectively, on the selection construct's R<sup>2</sup> value.

**Predictive Relevance (Q<sup>2</sup>):** For a particular reflective endogenous construct, the path model has a predictive value if the Q<sup>2</sup> value is above zero. Table 10 shows the blindfolding results report for the supplier qualification determinant model. As can be seen, the Q<sup>2</sup> value of the endogenous construct selection is considerably above zero (0.364). These findings well support the model's predictive value for endogenous latent variables.

**Table 7. Collinearity statistics (VIF) for supplier qualification determinants**

Constructs	Competence	Competitiveness	Relationship	Selection
Competence				1.977
Competitiveness				2.281
Relationship				1.674
Selection				

**Table 8. Structural Model for Supplier Selection as an Order Qualifier**

Relationship	β	t -Statistics	p -Values	Decision
Competence -> Selection	0.229	2.224	0.027	Supported
Competitiveness -> Selection	0.446	4.244	0.000	Supported
Relationship -> Selection	0.120	1.266	0.206	Not Supported

**Table 9. Effect size (f<sup>2</sup>) for supplier qualification determinants**

Constructs	Selection	Effect Size (f <sup>2</sup> )
Competence	0.053	Small
Competitiveness	0.175	Medium
Relationship	0.017	-

**Table 10. Predictive relevance (Q<sup>2</sup>) for supplier qualification determinants model**

Constructs	SSO	SSE	Q <sup>2</sup> (= 1- SSE / SSO)
Competence	800.000	800.000	
Competitiveness	700.000	700.000	
Relationship	500.000	500.000	
Selection	200.000	127.242	0.364

**Model Fit: Standardized root mean square residual (SRMR):** The SRMR enables evaluating the average magnitude of the discrepancies between actual and expected correlations as an absolute measure of (model) fit criteria. An SRMR value less than 0.10 or 0.08 (more conservative version) represents model fit [55], [136]. The SRMR value for the supplier qualification determinant model was 0.091, below the cutoff value of 0.10. This indicates that the supplier qualification determinant model has an acceptable level of model fit.

**4.1.3 Moderating effect of company size on the supplier qualification determinants**

Table 11 shows the moderating effect of company size in the supplier-qualifying model of RMG outsourcing. Company size depends on the industry, country of origin, and many other factors. Moreover, not all companies come from the same country of origin to compare. For this study, the country size has been divided into two groups: a) Small Companies and b) Big Companies based on the company sales. The selection of the company size was arbitrary because of the nature of the data. None of the factors, competence (p = 0.280), competitiveness (p = 0.767), and relationship (p = 0.922) were found to have a statistically significant moderating effect. Thus, H<sub>4a</sub>, H<sub>5a</sub>, and H<sub>6a</sub> were not supported.

**4.1.4 Moderating effect of company origin on the supplier qualification determinants**

Table 12 shows the moderating effect of company origin on selecting the supplier for qualifying. For this study, the country of origin

has been divided into two groups: a) Europe, Asia, and other countries, and b) North America. For all of the relations: competence (p = 0.080), competitiveness (p = 0.834), and Socio-Cultural factors (p = 0.950) moderating effect of company size is found to be statistically insignificant (p > 0.50). Thus, H<sub>4b</sub>, H<sub>5b</sub>, and H<sub>6b</sub> were unsupported.

**4.2 Suppliers' Order Winning Factors for RMG Outsourcing**

**4.2.1 Measurement model of supplier qualifying factors for RMG outsourcing**

The measurement model evaluates the reliability and validity of the model under study.

**Reliability:** The reliability is evaluated by Cronbach's alpha and composite reliability, for which a value of 0.70 indicates acceptable internal consistency. From the following Table 13, it can be seen that all the constructs have Cronbach Alpha and composite reliability values of more than 0.725, which is higher than the recommended value. Thus, the constructs were deemed to have adequate reliability.

**Validity:** The validity of this supplier order-winning model for RMG outsourcing is assessed from two dimensions: convergent validity and discriminant validity. Convergent validity is considered adequate when measuring constructs have an average variance extracted (AVE) of at least 0.50 and items loading is above 0.50 [133]. Table 13 shows that the average variance extracted (AVE) values are above 0.50, and the item loading values in Table 14 are 0.70. Therefore, conditions for convergent validity were met for the constructs and the items of this supplier order-winning model.

**Table 11. Moderating effect of company Size on the supplier qualification determinants**

Relations	Small	Big	Comparison		Comments
	β	β	β	p-values	
Competence -> Selection	0.097	0.212	0.115	0.280	Not Supported
Competitiveness -> Selection	0.562	0.427	0.135	0.767	Not Supported
Relationship -> Selection	0.270	0.022	0.248	0.922	Not Supported

**Table 12. Moderating effect of company origin on the supplier qualifying determinants**

Relations	Europe-Asia- others	North America	Comparison		Comments
	$\beta$	$\beta$	$\beta$	p-values	
Competence_ -> Selection	0.253	-0.259	0.513	0.080	Not Supported
Competitiveness -> Selection	0.507	0.801	0.294	0.834	Not Supported
Relationship -> Selection	0.031	0.398	0.367	0.950	Not Supported

**Table 13. Measurement model for supplier selection as an order winner**

Constructs	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Competence	0.873	0.899	0.527
Competitiveness	0.858	0.891	0.539
Relationship	0.846	0.889	0.616
Selection	0.725	0.879	0.784

**Table 14. Item cross-loading for supplier selection as an order winner**

Items	Competitiveness	Competence	Relationship	Selection
COM1	0.806	0.553	0.369	0.675
COM2	0.703	0.403	0.365	0.483
COM3	0.715	0.314	0.292	0.406
COM4	0.728	0.326	0.394	0.474
COM5	0.728	0.354	0.314	0.489
COM6	0.731	0.382	0.429	0.466
COM7	0.724	0.447	0.348	0.536
COMT1	0.356	0.758	0.256	0.345
COMT2	0.324	0.725	0.332	0.418
COMT3	0.420	0.708	0.280	0.456
COMT4	0.373	0.700	0.406	0.345
COMT5	0.289	0.703	0.282	0.398
COMT6	0.605	0.721	0.441	0.623
COMT7	0.280	0.758	0.269	0.476
COMT8	0.460	0.733	0.386	0.446
RE1	0.392	0.296	0.750	0.347
RE2	0.310	0.414	0.854	0.526
RE3	0.288	0.327	0.705	0.269
RE4	0.441	0.316	0.765	0.422
RE5	0.477	0.441	0.838	0.497
S1	0.561	0.566	0.523	0.879
S2	0.675	0.542	0.446	0.892

The discriminant validity of this supplier order winning model is assessed by the square root of the AVE (Fornell-Larcker Criterion), cross-loading matrix, and Heterotrait-Monotrait Ratio (HTMT) ratio. The square root of a construct's AVE and cross-loading items must have greater correlation values with items of own constructs than those of other constructs, respectively, for satisfactory discriminant validity

[134]. For HTMT ratio criteria, the construct must have a ratio below 0.90 with other constructs under consideration to satisfy the discriminant validity. Table 14 represents the cross-loading, Table 15 represents Fornell-Larcker Criterion, and Table 16 represents HTMT ratios. All of these tables show that constructs and items have good discriminant validity.

**Table 15. Fornell-larcker criterion for supplier selection as an order winner**

Constructs	Competence	Competitiveness	Relationship	Selection
Competence	0.726			
Competitiveness	0.553	0.734		
Relationship	0.464	0.488	0.785	
Selection	0.625	0.700	0.546	0.885

**Table 16. Heterotrait-monotrait ratio (HTMT) for supplier selection as an order winner**

Constructs	Competence	Competitiveness	Relationship	Selection
Competence				
Competitiveness	0.601			
Relationship	0.522	0.570		
Selection	0.758	0.868	0.671	

**Test for Common Method Bias (CMB):** Firstly, using SPSS, Harman's single-factor test using exploratory, unrotated factor analysis for all of the items has been done. The result of factor analysis produced 22 distinct factors, the largest of which accounted for only 38.121 % of the variance of the model. The outcome is less than the threshold of 50% or above. Secondly, the correlation matrix of the constructs (using Pearson's correlations) was applied to test whether the indicators have a correlation value over 0.90, which gives evidence that data have shown all the correlation values were below 0.90. Both tests indicate that our data is unlikely to have common method bias (CMB).

**4.2.2 Structural model for supplier order winning factors for RMG outsourcing**

The structural model helps to identify the path relationships among the constructs and access the connection for statistical significance through the VIF,  $R^2$ ,  $f^2$ ,  $Q^2$  path coefficient ( $\beta$ ), p-value, and t-statistics.

**Collinearity Statistic (VIF):** Table 17 shows the VIF values of all combinations of endogenous constructs (represented by the columns) and corresponding exogenous (i.e., predictor) constructs (represented by the rows). Table 17 shows that all the VIF readings are well below the 5 (threshold value). As a result, collinearity among predictor components is a minor concern in the structural model.

**Path Coefficient:** Table 18 presents the path coefficient of the structural model for supplier order winning determinants for outsourcing RMG. Table 18 shows that Competence ( $\beta = 0.289$ ,  $t = 3.378$ , and  $p = 0.001$ ), Competitiveness ( $\beta = 0.445$ ,  $t = 5.283$ , and  $p = 0.000$ ), and Relationship ( $\beta = 0.195$ ,  $t = 2.283$ , and  $p = 0.022$ ) - all of the constructs had a significant effect on supplier selection as an order winner. However, competitiveness exerts more influence than competence and relationship. Therefore, all the hypotheses  $H_{1b}$ ,  $H_{2b}$ , and  $H_{3b}$  were supported.

**Table 17. Collinearity statistics (VIF) for supplier order winning determinants**

Constructs	Competence	Competitiveness	Relationship	Selection
Competence				1.552
Competitiveness				2.598
Relationship				1.414

**Table 18. Structural model for supplier selection as an order winner**

Relationship	$\beta$	t -Statistics	p -Values	Decision
Competence -> Selection	0.289	3.378	0.001	Supported
Competitiveness -> Selection	0.445	5.283	0.000	Supported
Relationship -> Selection	0.195	2.283	0.022	Supported

**R Squared (R<sup>2</sup>):** The endogenous latent variable R<sup>2</sup> value has been examined, and the result shows that the R<sup>2</sup> value of the selection (0.598) can be considered moderate following the rule of thumb [135].

**Effect Size (f<sup>2</sup>):** The effect size (f<sup>2</sup>) values help access the endogenous constructs' contribution to an endogenous construct's R<sup>2</sup> value. The f<sup>2</sup> value of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively; however, any value less than 0.02 represent no effect [55]. Table 19 shows that competence (0.134, and relationship (0.067) constructs have a small but competitiveness (0.309) has a medium effect size on the Selection construct's R<sup>2</sup> value.

**Predictive Relevance (Q<sup>2</sup>):** The path model has predictive relevance for a specific reflective endogenous construct if the Q<sup>2</sup> value is above zero. Table 20 shows the blindfolding results report for the supplier qualification determinant model. As can be seen, the Q<sup>2</sup> values of the endogenous constructs Selection are considerably above zero (0.406). These findings well support the model's predictive value for endogenous latent variables.

**Model Fit: Standardized root mean square residual (SRMR):** The SRMR enables evaluating the average magnitude of the discrepancies between actual and expected correlations as an absolute measure of (model) fit criteria. An SRMR value less than 0.10 or 0.08 (more conservative version) represents model fit

[55,136]. The supplier order winning determinant model's SRMR value was 0.089, less than the threshold value of 0.10. This indicates that the supplier order winner determinant model has an acceptable model fit.

**4.2.3 Moderating effect of company size on the supplier order winning determinants**

Table 21 shows the moderating effect of company size in the supplier order-winning model of RMG outsourcing. For this study, the country size has been divided into two groups: a) Small Companies and b) Big Companies based on the company sales. The selection of the company size was arbitrary because of the nature of the data. Company size depends on the industry, country of origin, and many other factors. Moreover, not all companies come from the same country of origin to compare.

It can be observed from Table 21 data that competence (p = 0.184) and competitiveness (p = 0.994) were not found to have a statistically significant moderating effect. However, the relationship (p = 0.027) was statistically significant for large enterprises in selecting RMG suppliers as order winners. The company size category can explain 68.62 % of variations in supplier selection for issuing RMG outsourcing orders. Thus, H<sub>0b</sub> is supported, while H<sub>4b</sub> and H<sub>5b</sub> are not. This finding conforms to the outcome of the Sabnam et al. [137] study, where they found that large international buyers emphasize maintaining a relationship with suppliers that, in turn, helps adopt sustainable practices.

**Table 19. Effect size (f<sup>2</sup>) for supplier order winning determinants**

Constructs	Selection	Effect Size (f <sup>2</sup> )
Competence	0.134	Small
Competitiveness	0.309	Medium
Relationship	0.067	Small

**Table 20. Predictive relevance (Q<sup>2</sup>) for supplier order winning model**

Constructs	SSO	SSE	Q <sup>2</sup> (= 1- SSE / SSO)
Competence	800.000	800.000	
Competitiveness	700.000	700.000	
Relationship	500.000	500.000	
Selection	200.000	113.697	0.406

**Table 21. Moderating effect of company size on the supplier order-winning determinants**

Relations	Small	Big	Comparison		Comments
	β	β	β	p-values	
Competence -> Selection	0.173	0.327	0.154	0.184	Not Supported
Competitiveness -> Selection	0.653	0.262	0.391	0.994	Not Supported
Relationship -> Selection	0.055	0.388	0.332	0.027	Supported



**Table 22. Moderating effect of company origin on the supplier order-winning determinants**

Relations	Europe-Asia- others	North America	Comparison		Comments
	$\beta$	$\beta$	$\beta$	p-values	
Competence -> Selection	0.273	0.353	0.080	0.335	Not Supported
Competitiveness -> Selection	0.424	0.477	0.053	0.356	Not Supported
Relationship -> Selection	0.222	0.157	0.064	0.630	Not Supported

**4.2.4 Moderating effect of company origin on the supplier order-winning determinants**

Table 22 shows the moderating effect of company origin on selecting suppliers as order winners. For this study, the country of origin has been divided into two groups: a) Europe, Asia, and other countries, and b) North America. For all of the relations: competence ( $p = 0.335$ ), competitiveness ( $p = 0.956$ ), and Socio-Cultural factors ( $p = 0.0630$ ) moderating effect of company origin is found to be statistically insignificant ( $p > 0.50$ ). Thus,  $H_{4c}$ ,  $H_{5c}$ , and  $H_{6c}$  were not supported.

**5. CONCLUSION**

This study revealed that international brand companies in the apparel sector go through a simple two-step supplier selection process [40,42] through quantitative and qualitative approaches. Firstly, they invite expressions of interest (EOI) from the suppliers of readymade garments (RMG) to form a pool of qualified suppliers for outsourcing RMG. Secondly, international brands give orders of RMG to some suppliers from that pool.

For supplier selection, the criteria for qualification and order winning are different. A supplier needs competence and competitive qualities to get selected in the qualifying pool. However, suppliers need competence, competitiveness, and relationship qualities to win orders. For order allocation, big brands concentrate on the relationship. Data analysis did not find any significant moderating effect of brand origin for supplier qualifying variables or supplier order winning variables.

**5.1 Theoretical Implications**

This research added to the body of knowledge about global supply chain management by identifying the resilience area of Bangladeshi RMG suppliers. Furthermore, these resilient

characteristics also provide a foundation for further research in the apparel industry, where the literature on outsourcing regarding supplier determinants has scarcity.

Every industry is different and consequently possesses unique qualities. In global supply chain management, supplier determinants are distinctive to the readymade garments industry. This study uniquely identified the salient factors of choosing the supplier for RMG outsourcing, which could be used for cross-validation in other locations for RMG outsourcing. This study also uniquely identified that supplier-qualifying variables are different from supplier-order-winning variables. Finally, this study also uniquely identified that firm size (big firms) has a moderating effect on choosing the suppliers for order allocation for RMG outsourcing.

**5.2 Practical Implications**

To avoid public relations issues, international brand managers should emphasize competitiveness followed by competence factors while choosing the RMG supplier for enlistment. More reliance on cheap labor might result in a loss in the long run. Therefore, cheap labor is no longer a primary issue in enlisting and getting work orders.

RMG suppliers must concentrate on competent issues such as compliance and certification to get enlisted in qualifying pools. After enlistment, the RMG supplier should build a relationship and be honest in the business dealing because getting a work order relationship plays a vital role.

Policymakers of Bangladesh must maintain the macroeconomic and political factors and competitive factors found in the study, if not improved, to retain existing buyers and attract new buyers of RMG. In addition, policymakers of Bangladesh should concentrate on keeping the RMG supplier compliant for fire safety, building safety, and other public relations issues. It will

bring a win-win situation for all the parties involved in the RMG outsourcing.

RMG suppliers and policymakers must remember that competitiveness changes over time, especially labor cost advantages. While countries go through the development stages, labor costs and other related advantages evaporate. It happened in the USA and now happening in China. Thus, the suppliers must concentrate on productivity, innovations, and high-value-adding activities to neutralize the cost disadvantages.

### 5.3 Future Research Direction

Future research can be based on the findings of this study. Further research can be undertaken by augmenting with methodology, replicating this model in other industries, contexts, or countries, adding or removing variables that suit situations, and reversing the model to identify the factors affecting satisfaction, loyalty, and retention of foreign companies or apparel buyers.

### COMPETING INTERESTS

The author has declared that no competing interests exist.

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