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Implementation of Supply Chain Management in Bangladesh Readymade Garments Industry: The Challenges

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Abstract **- Readymade Garments Industry (RMG) is the largest foreign exchange earning sector for Bangladesh. After the Rana Plaza, Tazrin Fashion fire incident and Holey Artisan Bakery incidents, buyers across the globe have heightened the compliance requirements for this industry (Rayhan, 2016). Moreover, the industry is now in free market competition after Multi-Fibre Arrangement (MFA) and General System Preferences (GSP) have been lifted. The country needs to recoup the benefit of efficient implementation of Supply Chain Management (SCM) in order to achieve lower lead time, lower cost and higher quality. Cheap labor is no more giving required business for the RMG. This study aims to find out the challenges for efficient implementation of SCM in the sector. A descriptive analysis and use of Kendall Coefficient Concordance were made to find the ranking of the challenges. The study reveals that the main challenges for implementing SCM in RMG industry of Bangladesh is workplace safety followed by unavailability of locally produced raw materials and political instability.**

Keywords: **Supply Chain Management, Workplace Safety, General System of Preferences, RMG, Multi Fiber Agreement.**

INTRODUCTION

The Readymade Garments (RMG) Industry has become a mammoth industry for Bangladesh (Shahriar, 2014). It serves as the catalyst for the growth and development of the economy. The growth and ability to create employment opportunity especially for women is phenomenon. After the independence of the country in 1971, the country was one of the poorest in the world (World, Bank 2005). The industry is the single biggest export earner for Bangladesh (BGMEA, 2016) which is contributing significantly in economic growth. Bangladesh has a strong position in the global RMG market primarily because of its cheap labor cost. The MFA is quota system by the US federal government to support business from countries including Cambodia, Sri-Lanka, China, Kenya etc, with the aim of fostering their manufacturing capability and competiveness. Bangladesh started facing more anticipated and unanticipated competition from many RMG producing nations after the MFA became obsolete in 2005 (Asgari and Hoque, 2013). The market has become a truly open market for all participants. Presently, the Bangladesh RMG industry is struggling with cost, quality, customer service, and lead time. Many recognized buyers of different countries in the world are conducting trading activities simultaneously with different countries of the world. This globalization has become order of the day as cheap labor is available in some part of the world whereas raw material is readily available in others. Moreover, many time demanding factor like the time, cost and quality sensitiveness are also highly varied among customers in different continents of the world. It can be argued that Bangladesh could be competitive through efficient implementation of integrated SCM. This competitiveness should be achieved by ensuring the required efficiency and responsiveness. Traditionally,

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all the companies used to strive for improving the efficiency of their own company leaving aside the different partners of the Supply Chain (Power, et al., 2001). It means companies used to practice only quarter supply chain instead of extended supply chain. The extended supply chain concept considers an end to end process where it recognizes the Suppliers; supplier in the upstream and Customers' customers in the downstream.

OBJECTIVE OF THE STUDY

Following objectives have been identified for this study:

- To study the present situation of RMG sector of Bangladesh;
- To analyze SCM practices in RMG sector of Bangladesh;
- To find out the challenges behind efficient implementation of SCM in this sector etc.

PRESENT SITUATION OF BANGLADESH RMG INDUSTRY

Bangladesh apparel industry started its journey in the 1980s with very few companies and entrepreneurs. Now the industry has become the largest foreign exchange earning sector of Bangladesh. Bangladesh is the second largest RMG exporting nation after China. After the lifting of MFA and GSP facilities, the country is facing stiff competitions from other RMG producing countries including China, Vietnam, Cambodia, India etc. (Joardar, 2016). The historical timeline for the Bangladesh RMG has been shown in Table 1.

Table – 1: Important Timelines of Bangladesh Readymade Garments Industry

Ser	***Year***	***Issue***
1	1970-1980	Early period of growth
2	1982-1985	Boom days
3	1985	Imposition of quota restriction
4	1990	Knitwear sector developed significantly
5	1993	Child labor issue and its solution
6	2003	Withdrawal of Canadian quota restriction
7	2005	Phase out of quota restriction
8	2006	Riots and strike by garments labor
9	2007-20012	Stable growth
10	2013-2017	Decline and Undergoing Different Challenges

Sources: BGMEA and EPB - 2016

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RMG plays a vital role in generating employment opportunities especially for women in Bangladesh. The sector is struggling in generating more opportunities since 2010 and it further aggravated since 2013. This has been revealed in a research report by Bangladesh Institute of Development Studies (BIDS). World demand and price for RMG products have been reduced. Under this situation it has become difficult for new entrepreneur to make profitable investment thereby contribution by this sector in generating employment opportunity becoming reduced (Hossain, 2016). More than 4,000 RMG firms are listed with BGMEA. More than 95 per cent of those firms are locally owned with the exception of a few foreign firms located in export processing zones (Gonzales, 2002). The sector accounts for 81% of total export earnings of the country (BGMEA, 2017) (Table 2).

In Bangladesh, over the last two decades there has been a major transition from resource based export manufacturing to process based exports. The country has also transitioned from a heavy and weakening dependence on primary commodity exports to manufactured exports. Year-wise growth of RMG industry of Bangladesh is shown in Table 3.

Table – 2: Total Apparel Export in Millions of USD

YEAR	WOVEN	KNIT	TOTAL
1994	1544.89	341.53	1886.42
1995	1976.40	512.18	2488.58
1996	1942.37	686.27	2628.64
1997	2621.33	810.49	3431.82
1998	2871.06	976.29	3847.35
1999	2987.73	1169.90	4157.63
2000	3376.49	1448.22	4824.71
2001	3162.28	1432.72	4595.00
2002	3076.28	1573.40	4649.68
2003	3398.84	1850.36	5249.20
2004	3686.78	2532.62	6219.40
2005	3689.60	3210.48	6900.08
2006	4544.83	4388.67	8933.50
2007	4608.40	4741.93	9350.33
2008	5655.50	6223.42	11878.92
2009	5695.88	6194.61	11890.49
2010	7067.34	7787.26	14854.60
2011	9252.80	9961.67	19214.47
2012	10117.43	9670.71	19788.14
2013	12052.30	11448.68	23500.98
2014	12421.26	12162.70	24583.96
2015	13805.44	12797.26	26602.70
2016	14931.33	13736.95	28668.29

Source: BGMEA, 2016

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Table – 3: Year wise Growth of Garments Factories and Employment

Years	No. of Garment Factories	Employment (In Million Workers)
2005-06	4,220	2.2
2006-07	4,490	2.4
2007-08	4,743	2.8
2008-09	4,925	3.5
2009-10	5,063	3.6
2010-11	5,150	3.6
2011-12	5,220	3.7
2012–13	5,330	3.7
2013–14	5,450	3.7
2014–15	5,490	3.8
2015-16	4,300	4

Source: BGMEA - 2016

SCM IN BANGLADESH RMG SECTOR

The level of practice of SCM in Bangladesh RMG is not very satisfactory. Very few companies have separate SCM department through which they function with all the parties in collaboration. The level of practice varies from country to country and from company to company within country. SCM performance is a strategic tool for all the business firms to achieve competitive success with Bangladesh RMG is no exception to this. Bangladesh RMG manufacturers are importing required woven fabrics from countries including China, India, Pakistan and Indonesia. It results in relatively longer lead time comparing with other nations. The industry is yet to experience proper implementation of SCM where from it could recoup benefit. There are lot challenges for not implementing the SCM in the industry. People working in this industry are still not very aware of the SCM process and they like to carry on their business following traditional manufacturing system. The common components of Bangladesh RMG include: Supplier, Garment Industries, Individuals, Buyers, Raw Materials, Finished Goods, and Payment (Nuruzzaman, 2009). A supply chain includes all parties, directly or indirectly involved, in fulfilling a customer order. It includes transporters, warehouses, retailers, and even customer themselves besides manufacturers and suppliers. Every stage of SC is connected with other stages seamlessly for ensuring smooth flow of product, funds, information and feedback from suppliers' suppliers in one extend customers' customers on the other. Raw materials supplier supply raw materials to the manufacturer, manufactures make the product according to specification and sell to distributor, distributors in turn sell this product to the retailer and final consumers buy the product from the retailer. Supply chain stages include Raw material supplier, Manufacturer, Wholesaler/distributor, Retailer, Customer (Agami, 2012).

As just mentioned above, usually the supply chain comprises of suppliers, manufacturers, distributors, retailers and customers. However, there are different support organizations, services including port facilities, customs houses, communication infrastructures, Information Technology, 3 PL, and 4 PL etc involved in the chain. The customers are the center point of entire SC as the main focus of SCM is to satisfy customers. At the outset SCM was related with inventory management within a supply chain. Later on, business organizations recoup the benefit with advance SCM capabilities that ensured improved customer responsiveness, increased flexibility for changing market conditions, developed, and improved customer retention customer service and satisfaction, and more effective marketing. A supply chain is the chain of the process which includes facilities,

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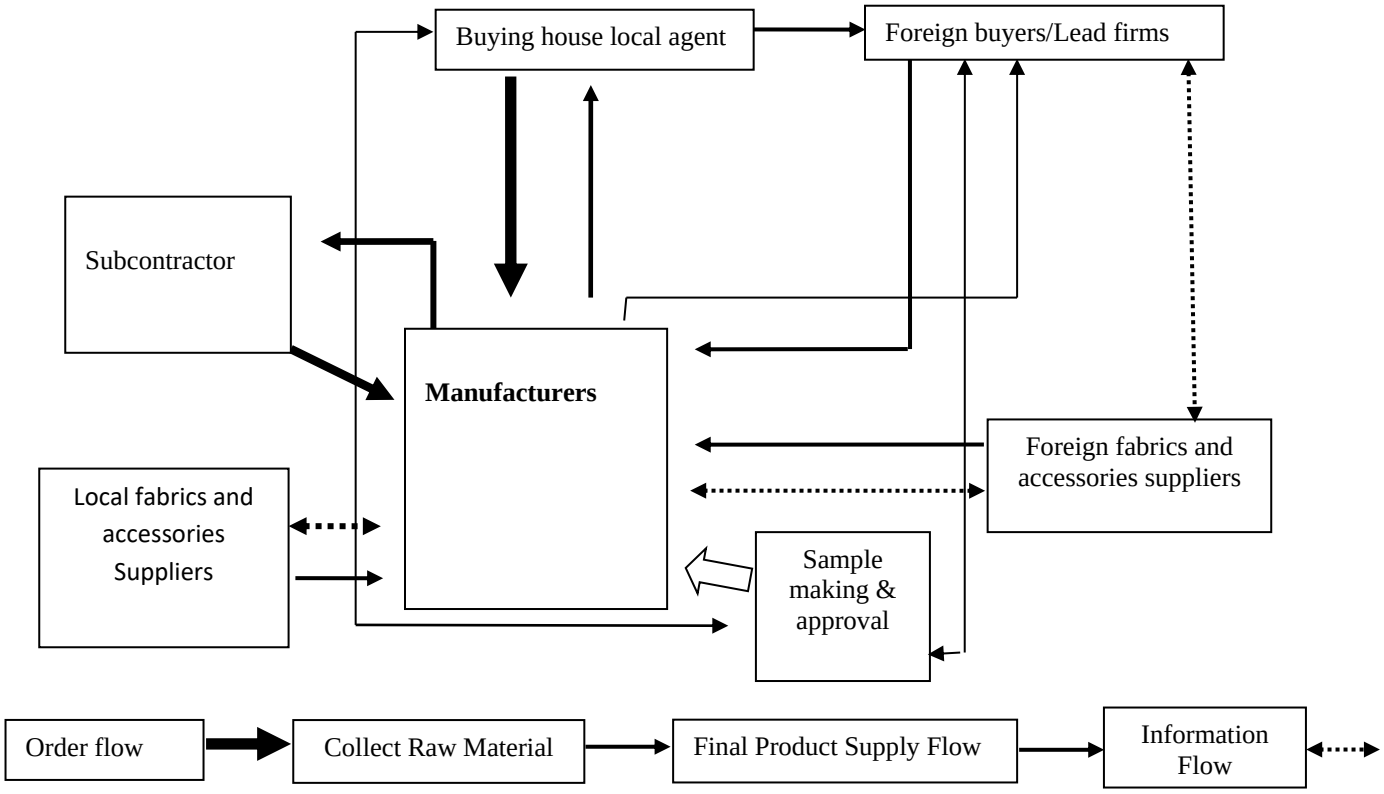
functions and activities that are involved in producing and delivering a product from supplier(s) to customer(s), Gonzales (2001). In addition to that following activities are conducted as part of company's SCM: Inventory management, Transportation service procurement, Materials handling, Inbound transportation, Transportation operations management. Nuruzzaman (2009) developed a model for Bangladesh RMG sector which is shown in Figure 1.



Source: Adapted from Nuruzzaman (2009)

Bangladesh is facing acute competitive disadvantage as buyers are shifting their preference from low cost RMG products to shortened lead time, timely delivery, and efficient responses on change in design and so on. The industry can meet these challenging demands by customers through efficient implementation of SCM.

LITERATURE REVIEW

According to International Chamber of Commerce, SCM is the management of the acquisition, transformation and delivery processes that enable and direct the flows of products & services – as well as the supporting reciprocal flows of information & funds – along a chain leading from the sources of the original inputs up to the end customers, all aimed at achieving the best possible customer service at the lowest possible cost. The Council of Logistics Management (2000) defines supply chain management as the systemic, strategic coordination of the traditional business functions and tactics across these businesses functions within a particular organization and across businesses within the supply chain for the purposes of improving the long-term performance of the individual organizations and the supply chain as a whole. Organizations started realizing the importance of improving the entire SC than improving within company to become more competitive. They now realize that understanding and implementing effective supply chain management (SCM) practices is an essential prerequisite to profitably competing in a global marketplace (Power et al., 2001; Li et al., 2005).

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Chen and Paulraj (2004) described SCM as a novel management philosophy that recognizes that individual businesses no longer compete as solely autonomous units, but rather as supply chains. Basak et. al., (2016) presented a study on supply chain effectiveness of clothing manufacturing companies in Bangladesh. The study, an investigative paper, focused on a conceptual supply chain management (SCM) model for RMG industry of Bangladesh. The paper argued that all the parties involved in extended SCM should collaborate each other both vertically and horizontally.

In Bangladesh, few studies have been made on different issues of the RMG sector. Asgari and Hoque (2013) stated that the customers were becoming more and more time-sensitive. They also argued that reduced lead time, improved quality and reduced cost can contribute in wining more orders from buyers. The study focused on 'an integrated supply chain to provide a competitive advantage to the Bangladesh RMG sector. Hossain and Roy (2013) presented SCM as a critical factor for achieving sustainable growth in the readymade garments industry in Bangladesh. They identified wages, supply chain, timeframe, and compliance as among the most important features of the business. Tanvir and Muqaddin (2013) presented SCM as the new paradigm for the Bangladesh RMG industry. The study highlighted a generalized assessment of the RMG industry of Bangladesh, its successes and provided a global context for discussion. Shahriar et al. (2014) presented a conceptual framework for the supply chain operation of factories in the RMG industry, and concluded that the prescribed framework would induce both effectiveness and efficiency if implemented.

Islam and Liang (2015) presented a case study on the supply chain management of apparel order processes. The study concluded that import dependency on backward linked industries is the main factor inducing long lead times, as more than 80% of input materials are imported. 55-75 days are required for importing fabrics by the RMG sector. The study argued that the sector is facing long lead times, approximately 90 to 130 days on the average. From their analysis, it is clear that the impact of information lead time is very negligible on total lead time, as it contributes only 6%. Agami et. al., (2012) presented numerous methods for the measurement of supply chain performance, namely financial, non-financial, perspective and efficiency based. SCOR and Score card were also presented. The study presented advantages and disadvantages of all mentioned measurement systems. Razzaque (1997) presented the challenges to logistics development, using Bangladesh as a case study on the issue. The study stated that the greatest obstacle to development or change is not accepting the need for it, and that competitive advantages are created and sustained through a highly localized process. Kader and Akter (2014) presented an analysis of the factors affecting the lead time for export of readymade apparels from Bangladesh and associated proposals for strategic reduction of lead time. The study proposed a three step strategy to ensure a shorter lead time. Ali and Habib (2012) stated that the effective SCM parameters of the textile industry included lower inventories, lower costs, higher productivity, greater productivity, greater agility, shorter lead times, higher profits and greater customer loyalty. The paper encompassed the constraints of the textile industry in Bangladesh, including ineffective communication, invisibility of SCM, long lead time, etc. which would unlock further research to develop this sector. Though there were few studies available on challenges for Bangladesh RMG sector but the study on challenge of efficient implementation of SCM is very scanty.

METHODOLOGY

The research has been carried out mainly through qualitative and quantitative research method. All officials who are directly or indirectly involved in supply chain related activities in RMG sector of Bangladesh were also considered as target population. The respondents were executives and managers working in the supply chain area in different sample garment companies. The study has used a probability sampling procedure, with cluster area sampling and stratified random Sampling being used to identify organizations for study. Out of different sampling methods, probability sampling method has been used for this study. The garments companies of Bangladesh are concentrated in the areas like Gazipur, Savar, Naraynganj, Tongi, Ashulia, Mirpur, Gulshan, Banani. Basically garments companies located in four different geographical locations have been selected for the respondents in order to collect data and these are Savar, Gazipur, Narayanganj and Banani (Table 4).
The sample for respondents has been determined adopting following formula:

$$n= \frac{NZ^2pq}{Nd^2+Z^2pq} =100$$

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Table – 4: Sample Distribution

Ser	Type of RMG	Weights	Number of Companies	Area/Location	Remarks
1.	Large	100 x .30	30	1. Ashulia, 2. Savar, 3. Gazipur, 4. Banani, Dhaka	Type of RMG has been decided on number of Production Lines and workers.
2.	Medium	100 x .30	30		
3.	Small	100 x .40	40		

Source: Primary

The following formula developed by Krejcie & Morgan (1970) has been used to calculate the sample size:

$$n = \frac{X^2 \times N \times P \times (1-P)}{(ME^2 \times (N-1) + (X^2 \times P \times (1-P)} = 399$$

Both primary and secondary data have been used for this study. For primary data, a questionnaire has been developed with both open and close ended questions in order to collected required information for the study. Only one set of questionnaire has been administered for the officials of SCM department of different selected companies. Relevant literatures, Articles, BGMEA reports were also consulted for collecting necessary data. A five point rating Likert scale was mostly used to rate the statement regarding the SCM practices in RMG sector of Bangladesh. A scoring model was used with lowest total score against any challenge becomes the first rank in the challenge. This model is a good fit for this study as it becomes very easier to rank evaluating the total score each challenge fetched from the respondents. Moreover, after having found the challenges of efficient implementation of SCM in the sector, it is interesting to know whether there is any association amongst different challenges. In finding that association Kendall coefficient of concordance was used as it provides better measures of association amongst different factors, challenges in this study.

HYPOTHESIS

In order to find out the association amongst the ranks in Challenges of efficient implementation of SCM in Bangladesh RMG industry, following hypotheses have been formulated.H0: There is no association amongst the ranks in challenge of efficient implementation of SCM in Bangladesh RMG industry in Bangladesh.HA: There is association amongst the ranks in challenge of efficient implementation of SCM in Bangladesh RMG industry in Bangladesh.

RESULTS AND DISCUSSIONS

Many researchers pin pointed number of challenges of Bangladesh RMG industry but there were hardly studies available on the challenges of efficient implementation of SCM. Few of the challenges include: Backward Linkage, Buying Behavior, Inefficient Planning, Lack of Safety Measures, Lack of Advanced Production Systems, Productivity Challenges, Weak Infrastructure, Lack of Deep-Sea Harbor, Poor Port Facility, Labor Unrest, Political Tensions, Security Issues, Lack of Automation, Increased cost of Manufacturing etc. A total of 15 different challenges of implementation of SCM in RMG sector have been pin pointed after carrying out in depth interview with Garments owners, BGMEA officials, and SCM professional and detailed literature review which have been given in the following table. Responses were collected from a representative sample through structured questionnaire. Descriptive analysis was made and the summary of the result has been put in the Table 5.

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Table – 5: Descriptive Analysis

SCM Challenges	Mean	Std. Deviation	Score Obtained	Freq with Highest Priority	Rank
1. Workplace safety	1.39	0.55	554	254	1
2. Availability of raw materials	2.33	0.93	928	63	2
3. Inefficiency of the workers	3.75	0.92	1496	11	3
4. Political instability	3.82	2.11	1524	45	4
5. Labor unrest	4.67	1.2	1865	12	5
6. Lack of training	6.64	1.05	2651		6
7. Incompetent ports entry	7.93	0.96	3165		7
8. Load-unload time	8.15	2.62	3251	6	8
9. Custom clearance	8.35	2.47	3331	13	9
10. Poor govt. policy	8.54	0.89	3409		10
11. Diesel and power	12.09	1.88	4523	1	11
12. Insufficiency of loan	12.9	1.29	5146	2	12
13. Lack of marketing tactics	13.09	1.02	5223		13
14. Managers, approach	13.22	2.01	5274		14
15. Blending procedures	13.23	1.92	5279		15

Source: Primary

Ranked data was collected from the respondents and statistical analysis was made through descriptive analysis and using Kendall coefficient of concordance. It has been observed that Safety issue for the RMG sector has been identified as the number 1 challenge for the efficient implementation of SCM with 254 respondents identified this to be highest priority. Inadequacy or dependency on imported raw materials haven identified as 2nd challenge and Inefficiency of workers and political instability have identified as 3rd and 4th challenge for efficient implementation of SCM in this sector. Labor unrest and lack of training of personnel in the RMG sector have been identified as 5th and 6th challenge for implementation of SCM. On the other hand, incompetent ports entry, loading unloading time custom clearance and poor government policy has been identified as 7th, 8th, 9th and 10th challenges. Respondents also ranked other challenges with different ranks as shown in the Table 5.

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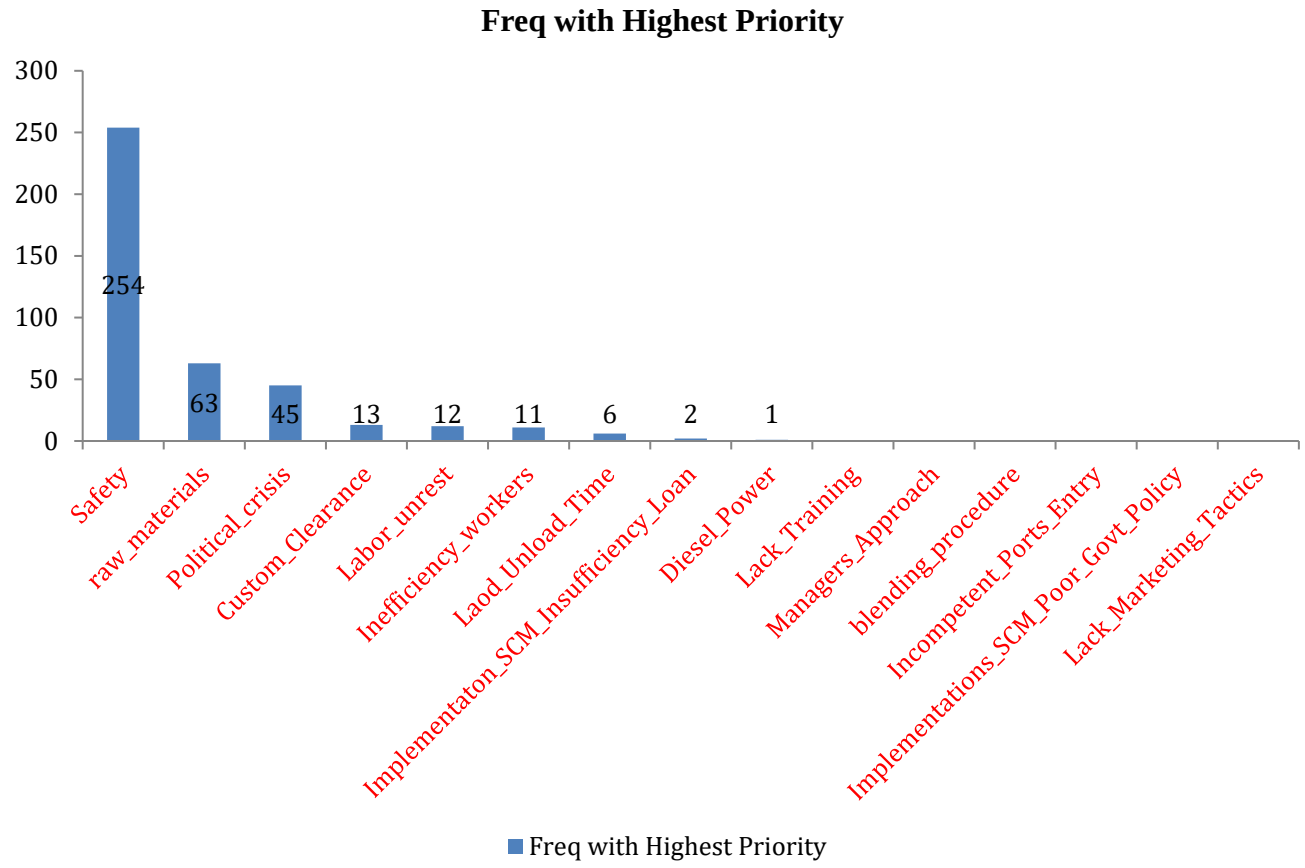

Figure – 3: Ranking of Challenges of Efficient Implementation of SCM in RMG

Considering the various useful tools and formula applicable for non-parametric tests, Kendall Coefficient of Concordance (W) was applied. To prove the application of Kendall Coefficient of Concordance (W) in determining the position of above stated factors which affect the challenges of the efficient implementations of SCM in the RMG sector in Bangladesh and their ranks, average correlation and association of variables have been calculated. The detailed process of obtaining result has been given in Appendix -1. Again, the collected data were firstly arranged into KxN Table (Appendix - 2) with each row representing the ranks assigned by a particular respondent to the N objects. Next the sum of ranks (Ri) in each column of the Table shown in the Appendix by adding the total rank numbers of each column. If any column gets the lowest value then that column would be ranked first and the column that gets the highest value will be ranked last. The meaning of the first rank is most important and the last rank is least important. Next we found out the average ranks of each column. To find that average rank, total rank number of each column was divided by number of respondents (K). The next step was to find out the mean value of each column. To do this, the sum of $\sum Ri$ will be divided by the number of causes being ranked (N). Each of the Ri may be expressed as a deviation from the grand mean. The critical value of c2 at 14 degree of freedom and at 0.001 level of significance is 29.141 indicating that Ho is rejected. It means that the alternative hypothesis (H1) is accepted meaning that there is good association among the ranks of causes of poor implementation of SCM in RMG industry of

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Bangladesh and the association is significant at 0.001 level of significance.

CONCLUSIONS

After the collapse of Rana Plaza and Tazrin Fashion fire incident buyers are imposing more compliance issues that put the industry in more challenging situation. Bangladesh needs to implement proper SCM in order to become competitive in the market place. The lead time is a great concern for the buyers apart from cost and quality. There were prior studies available in trying to ascertain the challenges/causes of poor SCM in the industry. But over the past period the priority of the challenges have changed with compliance/safety issue being the top most challenges for the industry working as barrier to efficient implementation. If Bangladesh needs to achieve its target export volume of 50 billion dollar by 2021, she must first know the challenges with priority those need immediate attention by all concerned. In the open market after removal of GSP and MFA, the industry is facing stiff competitions from countries including China, Cambodia, Sri Lanka, India and Ethiopia. The present port congestion has added more fuel to the inefficiency of SCM in the sector. The study assigned scores against each challenge so identified and found out the mean of responses. Moreover, Kendall Coefficient of Concordance has also been used for finding out the associations amongst the challenges. The study findings suggest that safety issue imposed by buyers, unavailability of raw woven fabrics (raw materials), inefficiency of workers, political instability and labor unrest are the top five challenges for efficient implementation of SCM in the industry. This study identified the challenges with ranking that will help policy makers in taking appropriate measures for making the industry competitive.

RECOMMENDATIONS

Basing on the analysis, following few recommendations have been made addressing which would facilitate efficient implementation of SCM in the Bangladesh RMG industry to become competitive.

- BGMEA and government should engage with foreign buyers in order to achieve trust and confidence so that buyers extend more cooperation in complying with safety requirements. Here employing professional lobbyists may also be considered in order to negotiate better business deal for Bangladesh RMG sector.
- Because of the land scarcity in the country and higher cotton production cost, mass scale cultivation of cotton may not be suggested but the sector should strive for reducing conversion cost and improving SCM practices. Bangladesh government may not impose any tariff and quota on cotton import by the RMG manufacturers.
- Bangladesh political parties should strive for the political stability through democratic change of regime after their tenure and through improving democratic practices. Moreover, government should make more industry friendly policy to promote the export by effective engagement with BGMEA and other professional bodies.

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Appendix - 1 Process of Obtaining Results

$$W = \frac{\sum_{i=1}^{n}(R_i - R)^2}{N(N^2-1)/12} \ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where,

W=the degree of association among the 400 respondents in ranking 15 causes

Ri= the average of the ranks assigned to the Cause.

R = the average (or grand mean) of the ranks assigned across all causes.

N = number of causes being ranked.

K = number of respondents.

N (N2-1) /12 = maximum possible sum of the squared deviations, i.e. the numerator which would occur if there were perfect agreement among the K respondents.

Now let us have a look on the results obtained by using different statistical packages such as Microsoft Excel and SPSS. These are as follows:

c2 (chi-square) = K (N - 1) W,
at (N-1) degree of freedom.

Results:

W = 0.8744

c2 = 400(15-1) 0.8744 = 4896.64

The way of calculation is given below:

R_i = Sum of Ranks given against 15 possible causes = 120

$$R = \frac{\sum R_i}{N} = \frac{120}{15} = 8$$

$$\sum(Ari - R)^2 = (1.385 - 8)^2 + - - - - + (8.523 - 8)^2 = 244.840$$

N (N^2-1) / 12 = 15 (15^2-1)/12 = 280

$$W = \frac{244.840}{280} = 0.874$$

Although equation (1) shows the intuitive rational for the statistics of W, a somewhat simpler formula may be used. This formula is,

$$W = \frac{12R_i^2 - 3K^2N(N+1)^2}{K^2N(N^2-1)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where R_i^2 is the sum of the squared sums of ranks of each of the N factors.

$$\sum R_i^2 = 554^2 + - - - - - - - + 3409^2 = 192243077$$

Substituting this value into equation (2) we get,

$$W = \frac{12(192243077) - 3(400)^2 15(15+1)^2}{400^2(15)(15^2-1)}$$

W=0.8625(observed value)

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Appendix – 2 Process of Obtaining Kendall Coefficient of Concordance

Respondents	**i**	**ii**	**iii**	**iv**	**v**	**vi**	**vii**	**viii**	**ix**	**x**	**xi**	**xii**	**xiii**	**xiv**	**xv**	**Total**
1	1	3	2	12	4	5	3	13	6	11	15	8	10	9	7	120
2	1	12	5	12	4	2	3	13	6	11	15	8	9	10	7	120
3	1	15	4	13	3	2	5	14	6	12	6	7	10	9	8	120
4	2	14	1	13	3	5	4	12	7	15	11	8	6	10	9	120
5	1	14	2	12	4	5	3	13	7	11	15	8	6	10	9	120
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
395	1	13	2	14	5	6	3	12	7	15	11	9	4	8	10	120
396	2	10	3	12	4	5	11	14	7	15	12	12	1	8	9	120
397	2	14	1	13	5	4	3	12	6	3	15	7	11	8	9	120
398	1	10	2	14	3	4	8	13	5	15	12	11	7	6	9	120
399	2	12	3	13	5	6	1	14	9	11	15	7	4	10	8	120
Ri	554	4823	928	5146	1496	1865	1524	5223	2651	5274	5279	3165	3251	3331	3409	47919
Average Ri (ARi)	1.39	12.05	2.32	12.86	3.74	4.66	3.81	13.05	6.62	13.18	13.19	7.91	8.12	8.32	8.52	119.80
Grand Average **(R)**	**7.98**															
(ARi-R)*(ARi-R)	43.76	16.46	32.26	23.67	18.15	11.14	17.64	25.58	1.88	26.88	27.01	0.01	0.02	0.11	0.27	244.84
Ranks	1	11	2	12	3	5	4	13	6	14	15	7	8	9	10	
W	**0.8744**															
Ri*Ri (0000)	3	2326	86	2648	224	348	232	2728	703	2782	2787	1002	1057	1102	1162	19224
W	**0.8744**															