IMPACT OF INVENTORY MANAGEMENT PRACTICES ON OPERATIONAL PERFORMANCE:
A Case Study on Bangladesh Rmg Sector

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Abstract*: This study aims in studying impact of inventory management practices on operational performance of Bangladesh RMG sector. It examines the inventory system that is being followed in this sector critically. Data was collected through structured questionnaire from representative respondents. Different constructs for the conceptual framework has been adopted from prior literatures. A mixed method research approach has been employed. Both descriptive and inferential statistics were used in analyzing the data so collected for answering the research questions. The study shows a positive relationship between selected inventory management practices with selected operational performance metrics with different degree which is consistent with previous literatures.*

Keywords: *Inventory management, Effectiveness, Performance, Garments.*

INTRODUCTION

Garments industry is the life line industry of Bangladesh which is the largest export earning sector for the country as well. It contributes Bangladesh economy in experiencing significant growth. The country enjoys a strong foothold in the global RMG market primarily because of its cheap labor cost. After the lifting of Multi-Fiber Arrangement (MFA)in 2005 which is quota system provided by the US federal government to promote import from developing countries, Bangladesh started facing more intense competition from many RMG producing nations(Asgari and Hoque, 2013). Presently, the Bangladesh RMG industry is struggling in the areas including cost, quality, customer service, and lead time. Many reputed buyers across the world are buying RMG productsfrom different countries. 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 other parts. In order to remain competitive, Bangladesh RMG sector must use SCM as a strategic tool.

It can be argued that Bangladesh could achieve more competitive edge through efficient implementation of integrated SCM. This competitiveness should be achieved by ensuring the required efficiency and responsiveness. It means, traditionally, companies used to practice only quarter supply chain opposed toextended 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.Inventory management (IM) practices have emerged as most important function off late and truer for RMG sector. With the increase the demand of garments product globally, the importance of IM has become more intense.JIT is a philosophy of management that reduces waste and improves quality in all business process in reducing inventory of all kinds (Harrison and Hoek, 2011).In a clothing industry, inventory of different kinds are important for seamless production process. Due inefficient IM in apparel industry, large amount of cost is being incurred which eventually decreases the profits of that organization. Some organizationslack in value creation because of poor stock administration.

PROBLEM STATEMENT

An optimum level of inventory for any manufacturing company is considered to be the key success factor for improving operational performance. But,the appropriate level of inventory dependson the accuracy of thedemandforecasting in responding to market demand. Inventory is considered as evil as it earns nothing unless those are sold. Global companies are practicing different inventory management models to promote their competitiveness and performances. Inventory management is common practice in business organizations,an evolution for inventory management from JIT to lean inventory systems to supply chain management has emerged. Bangladesh RMG sector lacks in appropriate IM practices due to unpredictability in business operations mostly. In the era of intense competition with other RMG producing nations, this sector must follow appropriate IM practices in order to remain competitive. The sector can expect to foster operational performance through following modern and contemporary IM practices.

RESEARCH OBJECTIVES

General Objective: To identify the role of inventory management practices on the operational performance of Bangladesh RMG Industry.

Specific Objectives

a) To study the inventory management practices used by garment industries inBangladesh;

b) To study the level of effectiveness of inventory management practices of Bangladesh RMG industry;

c) To identify the relationship between inventory management practices and operational performance of Bangladesh RMG industry.

RESEARCH QUESTIONS

Considering the research objectives of this study, following research questions have been investigated:

1. To what extent Inventory Management Practices have been implemented in Bangladesh RMG sector?

2. To what extent Inventory Management Practices so implemented in the Bangladesh RMG sector are effective?

3. To what extent there is a relationship between Inventory Management Practices and the Operational performance in Bangladesh RMG sector?

LITERATURE REVIEW

An inventory system is the set of policies and controls that monitor levels of inventory and determine what levels should be maintained, when stock should be replenished, and how large orders should be (Adam J., et al 2005). Manufacturing inventory usually means the items that are used to make a firm's final product. It is usually divided into raw materials, finished products, component parts, supplies, and work-in-process. Retail stores maintain finished goods inventory for quick sale to consumers. In services, inventory usually refers to the physical goods to be sold and the supplies need to administer the service (Lee, 2001). The basic purpose of inventory analysis, whether in manufacturing, retail, or services, is to specify (when items will be ordered and in what size.

In Just in Time (JIT) manufacturing philosophy companies are entering into longer-term relationships with ultra-reliable vendors to supply their needs for whole year. This changes the basics of IM "when" and "how many to order" to "when" and "how many to deliver" (R. Michael D. 2007). In this, real time information is key to its performance and existence. Right use

of information technology is needed to facilitate tracking and recording of inventory. IM has become more dynamic with introduction of chips, sensors and Radio Frequency Identification (RFID). The use of computers helps in keeping proper records and maintain the relevant inventory levels at an optimum level (Carter & Price, 2010).

Electronic Data Interchange (EDI) are used in some companies for effective IM. In this system, direct communication between organizations involved in the handling of inventory and company takes place. It involves transmitting and receiving of data in a structured manner by trading partners without the intervention of people (Jessop, 2006). Lysons et al (2012) in their study opined that Information Technology (IT)employs the use of Electronic Point of Sale (EPOS) for better IM in different industries. This technology helps in scanning and capturing information relating to items that are sold. The application of all these IT tools help achieving customer satisfaction and subsequently financial performance. The concept of operational performance is a relative concept; no one common definition is available in the literature. Many researchers examined operational performance with many different metrics depending on the industry and interest in question.

Firm performance refers to competitive ability of a company against other incumbents in the market. It promotes competitive capability in a homogeneous market or industry and succeeds better than others. Different researchers arguedthat success of a firm depends on its superior performance; and that the performance of the firm can be measured by the financial and nonfinancial performance. Hart &Ahuja, (1996), Konar& Cohen (1997) mentioned that the firm performance can be measured using financial performance. Wernefelt& Hansen (1989) used Return on Asset (ROA)in measuring the firms' performance in their studies. On the other hand, Kalpan& Norton, (1996) argued that with the growing age of the information systems, the financial or the accounting measures are inadequate in measuring the firm performance. They used Balance Score Card (BSC) that describes the method that a firm can measure and even manage to become financially healthy.

In another study by Bezzel et al (1995) argued that the key indicators of a firm's performance are the marketing expenditure, relative product quality and the level of productivity. Furthermore, Gunasekaran et al (2004) opined that operations of a firm can be adequately measured using the qualitative measures. Ian (2005) posits that firm performance can be measured by elements that relates to outcomes including output such as quality service, flexibility, resource utilization and innovation.

METHODOLOGY

The study employs a mixed research method; used both qualitative and quantitative data. A stratified sampling under probability sampling method (known population) has been used for this research. The garments companies of Bangladesh are mostly located in the places like Gazipur, Savar, Narayanganj, Tongi, Ashulia, Mirpur, Gulshan, Banani. Basically garments companies concentrated in four different geographical locations have been chosen for the respondents to collect the required data and they are Savar, Gazipur,Narayanganj and Mirpur (Table 1). The sample for respondents has been determined using following formula developed by Krejcie& Morgan (1970):

$$n = X2NP(1 − P) + d^{\wedge}(N − 1) + X2P(1 − P) \, .$$

$$n = X2NP(1 - P) = d'(N − 1) + X2P(1-P) = 399$$

The sample has been found out using 95% confidence level and P=0.50, *d* =0.05, N= 4368, and x2 = 3.841(1.96 X 1.96).

However, 100 RMG companies have been selected and appropriate weights have been assigned against large, medium and small companies on the basis of locations. Moreover, the size of the companies has been decided on the number of productions lines available in those companies.

Table 1
Sample Distribution

Ser	Type of RMG	Weights	Number of Companies	Area/Location	Remarks
1.	Large	100x.30	30	Ashulia	Type of RMG has been
2.	Medium	100x.30	30	Savar	Decided on number
3.	Small	100x.40	40	Gazipur Mirpur, Dhaka	production lines workers.

Questionnaire was the most important instrument of this research study. Direct interview was conducted with key responsible persons in garments companies to gather qualitative and quantitative information. The interview was conducted in formal waywith a structured question.

HYPOTHESIS

After thorough investigation of the literature review, objectives following hypothesis has been formulated:

H_0: There is no relation between the inventory management practices and organization performance in Bangladesh RMG industry.

H_1: There is a relation between the inventory management practices and organization performance in Bangladesh RMG industry.

CONCEPTUAL FRAMEWORK

Inventory management is the most crucial function of any manufacturing companies and RMG companies are no exception to it. There are number of IM practices available in the industry but for brevity sake only seven most relevant practices including Inventory budgeting, Inventory tracking, Lead time, Re-order Point, Just-in-time system, ERP system and Use of IT have been adopted from previous literatures. On the other hand, six most widely used metrics and proxies of operational performances relating to inventory including Reduce Inventory level, Pricing of goods in warehouse, Replenishment of stock, Storage capacity utilized, Led to timely delivery of Product, Waste reduction have been considered. All these variables and constructs have been measured through a structure questionnaire adopted from prior literatures.
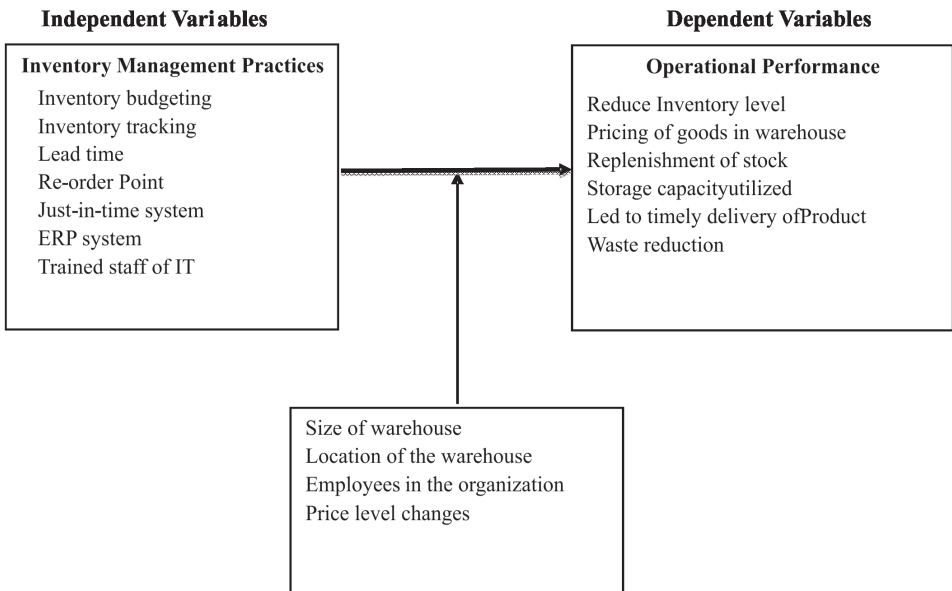
Independent Variables   **Dependent Variables**

Inventory Management Practices
Inventory budgeting
Inventory tracking
Lead time
Re-order Point
Just-in-time system
ERP system
Trained staff of IT

Operational Performance
Reduce Inventory level
Pricing of goods in warehouse
Replenishment of stock
Storage capacityutilized
Led to timely delivery ofProduct
Waste reduction

Size of warehouse
Location of the warehouse
Employees in the organization
Price level changes

Figure: Conceptual Frame Work

Source: Primary

DATA ANALYSIS

The data so collected on IM from the respondents and sample companies have been analyzed through descriptive and inferential statistics. The descriptive statistics on IM practices by Garments industries have been given below:

Table 2
Descriptive Statistics on IM

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
1. The firm uses just-in time system to manage its inventory	399	1	5	3.29	982	.964
2. ERP system (barcode) is widely used by the firm to manage it is inventory	399	1	5	3.36	1.014	1.029
3. the firm uses material requirement planning to manage it is inventor	399	1	5	3.58	1.050	1.103.
4. management is aware of scientific approaches of inventory management	399	1	5	3.46	.986	.973
5. the firm uses computers to manage it is inventory	399	1	5	3.55	.998	.997
6. staff members are well trained on use of IT	399	1	5	3.50	.987	.974
7. The firm uses EDI to exchange data with its suppliers	399	1	5	3.37	1.013	1.027
8. The firm uses EPOS, to capture information relating goods sold	399	1	5	3.40	1.093	1.195
Valid N (list wise)	399					

Here, if mean u is equal or smaller than 3 that means IM practices is low, and if u is greater than 3 that means IM practices is high. In the above table, we can see that the highest mean value is 3.58 and lowest mean value is 3.29. The grand average mean, we got from this table is 3.44. So we can say that IM practices in garments industries of Bangladesh are good.

Table 3
Descriptive Statistics of IM Effectiveness

	N	Minimum	Maximum	Mean	Std Deviation	Variance
1. Preparation of inventory budget	399	1	5	3.52	1.000	.999
2. Updating inventory budget	399	1	5	3.44	1.008	1.016
3. Use computers in preparing inventory budget	399	1	5	3.50	1.005	1.009
4. Regular stock tracking	399	1	5	3.51	.992	.984
5. Store Staffs are very skilled	399	1	5	3.59	1.033	1.067
Valid N (list wise)	399					

Here, if mean u is equal or smaller than 3 that means inventory management effectiveness is low, and if u is greater than 3 that means inventory management effectiveness is high. In the above table, we can see that the highest mean value is 3.59 and lowest mean value is 3.44. The grand average mean, we got from this table is 3.51. So we can say that IM effectiveness in garments industries is good.

Table 4
Independent Samples Test

		Levene's Test for equality of Variances		t-test for Equality of Means						
		F	Sig	t	Dr	Sig (2Tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the difference	
Mean IM	Equal Variances assumed	.350	.555	5.285	397	.001	.34266	.06484	.21519	.47014
	Equal Variances not assumed			4.796	74.064	.001	.34266	.07145	.20029	.48503

In the above table, independent samples test, we can see that significance level is lower than 0.05. So there is no good reasons to accept null hypothesis

which is there is no relation between the inventory management practices and operational performance in Bangladesh RMG industry.

DISCUSSION AND SUMMARY OF FINDINGS

The respondents were requested to state the extent to which their firms practice the IM practices of information technology and lean inventory system. Regarding information technology, the most common practice is use of computers to manage inventory with the mean of 3.55, followed by the use of EDI by the firma to exchange data with suppliers with a mean of 3.37 and then the training of staff members with a mean of 3.50. The last practice is the use of EPOS to capture information with a mean of 3.40. The standard deviation average of 1.023 shows that there were no remarkable deference in the responses while an average mean of 3.46 shows that the companies use information technology as an inventory management approaches. The study also established that the companies use lean IM with a mean of 3.43 while the mean standard deviation of 1.008 shows that there were no remarkable difference in the responses. However, the lean IM practice is low in Bangladesh RMG industry. The most commonly adopted practice was the use of material requirement planning with a mean of 3.58 followed by the use of just in time system and barcodes with a mean of 3.36. The least practice was the awareness of the scientific approaches in inventory management with a mean of 3.46.

The research found out that the IM practices were effective with an average mean of 3.51 and a standard deviation of 1.007. The system led to the adoption of up to date technology within the organization with a mean of 3.41 followed by leading to timely delivery of goods and services to customers requirements with a mean of 3.43. The least effect was that IM approaches have led to effective utilization of storage facility in the firm having a mean of 3.69. The research also found that the average constant correlation coefficient is 1.881 thus there is a strong positive correlation between the inventory management practices and organizational operational performance of the RMG sector in Bangladesh. The regression co efficient also explains a good positive relationship between the independent variables and organizational operational performance.

CONCLUSION

The study aimed at establishing the role of IM practices on the operational performance of garments industries of Bangladesh. The research found out that the companies used information technology and lean inventory system

in managing their inventory of all kinds. Averages mean of 3.46(IT) shows that the industries' uses information technology as an IM practices. The study also determined that the industries use lean IM with a mean of 3.43(Lean). These outcomes of the research are consistent with the study that effective IM requires an effective information technology infrastructure. The study further determined that the IM practices were effective with an average mean of 3.51 and a standard deviation of 1.007. The practices led to the apply up to date technology within the firm with a mean of 3.41 followed by leading to timely delivery of goods and services to customers requirements with a mean of 3.43. The least effect was that IM practices have led to effective utilization of inventory facilities in the organization having a mean of 3.69. The study also suggests that implementation of modern IM techniques enables companies to achieve and sustain high levels of competitive advantages. According to the analysis, the garments manufacturing company should come up with the best mechanism of facilitating faster implementation of the best practices of IM such as Just-In-Time and Material Requirement Planning (MRP). Another recommendation is for governments to have adequate policies to help regulate and facilitate operations of foreign companies especially in the area of inventory acquisition and management.

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