



Review on Industry 4.0 and Challenges of Implementation in Garment Industries of Bangladesh

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Abstract

Nowadays the 4th industrial revolution is a very popular and common topic used as IR 4.0, which will perform a vital part in the ongoing automation of existing industrial system to algorithms. The world is coming nearer with Information Communication Technology (ICT) creation through digital transformation Industry 4.0 (IR 4.0), also known as Smart Factory which is a continuous running process of the industrial revolution like the industrial revolution 1.0, 2.0, and 3.0. It is considered as integration on value networks horizontally, end-to-end digitalization across the full value chain, and vertical combination of a database production system. Continuous improvement of products by value-adding activities in the manufacturing process without or less intervention of human beings and to reduce waste is the main goal of it. The objective of this review article is to understand the industry 4.0 with identifying the challenges and issues happening with implementation in Bangladesh Readymade Garment (RMG) Industries. At present we are not in a position to implement IR 4.0 fully in our country. It may be applied phase-wise.

Key words: Industry 4.0, Automation, RMG, ERP, CIM.

Keywords: Jute Fabric, Basic Dye, Polyacrylamide, Common Salt, Spectrophotometry, Color Fastness

1. Introduction

The Industry 4.0 concept is first presented by the German Federal Government in 2011 and a roadmap was released in 2013. It refers to the intelligent networking of machinery and processes for industry with the help of information and communication technology. It is basically a combination of using artificial intelligence, automation in production process, using programming language for required software applications, such as integrated Enterprise Resource Planning(ERP) system, Manufacturing Execution System(MES), Systems Applications and Products(SAP), Microsoft Project Management (MPM), Product lifecycle management (PLM), Supply

chain management (SCM), Forecasting productivity data, etc. use of internet, 3D printing, Data furcating, trouble shooting and so on.

The main supporting industry 4.0 are autonomous robots, industrial internet of things (IIoT), large data and analytics, imitation/digital matching, enlarged reality, additive manufacturing, cyber security, cloud computing, horizontal and perpendicular system integration, etc.

It gives such an environment where automation is used for increasing the productivity with less no. of defects, finding the

optimum production process, data analyzing, problem-solving, less no. of human required and maintains effective backward and forward linkage, better human resource managements, etc.

However, the prime goal of IR 4.0 is to fulfill the specific customer requirements which affect zones such as managing the orders, product research, and development, industrial set up, distribution up to the usage and reuse of products.

The basic-variance between IR 4.0 and Computer Integrated Manufacturing (CIM) is the human role in the manufacturing environment. Industry 4.0 has significant roles of human workers in execution the production whereas computer integrated manufacturing considered eliminating workers in manufacture [1-5]. The drawbacks of IR 4.0 are Inequality which means trained employees will get more facilities than others; Cybersecurity risk in icatethe risk of hacking and tampering data, Core industries disruptions i.e., systematic development of industries will not occur as

Traditional television and cinema compete with Netflix and YouTube, and Ethical issues, etc. The target of this review is to study the impact of IR 4.0 in Bangladesh Apparel Industries.

2. History of Industrial Revolutions

In the United Kingdom (UK), the first industrial revolution was appeared in the 18th century depending on mechanical production. As a result, the workplaces were controlled by males, and females were enforced out of production places. This revolution proceeds to the growth of native and international market economies, the significance of independent governments, and growing midincomein western parts of the world.

The impact of the second revolution in 1870 was primarily due to the introduction and development of new type machinery such as the phone, gas turbine, synthetic fertilizer, steamships, rail tracks, electronic light, and typewriter, among others, which led to mass manufacturing, product standardization, the

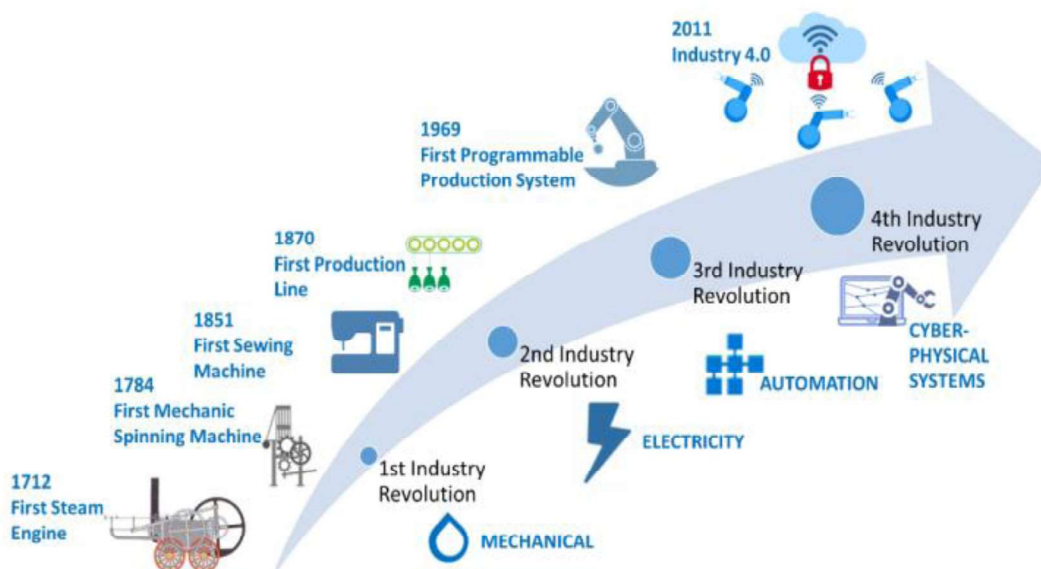


Figure 1: Advancement of industrial revolution (Courtesy- E. Gökalp, M. O. Gökalp, P. E. Eren)

growth of significant technological structure, precision manufacturing, and the advent of the public transport based on ignition engine.

In 1969, the third industrial or digital uprising presented and advanced the individual computer, and the internet led to the democratization of evidence, price reductions, and fast quality enhancement, signaling a new age of entrepreneurship; reforming the economic structure, and making calculation easier for businesses and government. In addition, the industry 4.0 discusses the workplace digitalization and automation, which will profoundly alter working conditions, economic practices, and cultural phenomena in the future decades [6-12].

In Bangladesh, the impact of the industrial revolution was seen during the last three centuries where traditional boats were suppressed by motor boats and steamers, type writers to computers, hand spinning to machine spinning, handlooms converted to power looms, Hand sewing to higher speed sewing machinery of garments and so on. Figure 1 shows the sequential industrial revolutions of the world.

3. Contribution of Apparel industries in the economy of Bangladesh

Since 1980, the Ready-Made Garment (RMG) sector plays a critical part in Bangladesh's socioeconomic development.[14]. In an annual survey, the industries of Bangladesh show that manufacturing is dominated by 96.5% of all industries while 86% of them are garments products and again more than 80% of foreign currency earning sector of Bangladesh. Approx. 5000 garments industries are located in Bangladesh and 4.4 million people are working there. Bangladesh enjoys Generalized System of Preferences

(GSP) facilities for the apparel zone to Japan, Australia, New Zealand European Union (EU), Canada, and several duty-free market place get right of entry to China, South Korea, India, and Asia Pacific Trade Agreement (APTA) scheme for China, South Korea.

Nowadays excessive value-added clothing production is on the rise in our country. There is an indication of a continuous quality increase in Knit & Woven garments export from Bangladesh. Not only the RMG products but also its supportive backward and forward linkage enterprise such as apparel accessories industries, varied jute items manufacturing industry, packaging industry also earns foreign currencies which make contributions in the export zone of Bangladesh. Figure 2 shows the strengths of the apparel industries in Bangladesh, e.g. competitive price, experience, commitment, safety, workforce, and so on.



Figure 2: The strengths of the apparel industries in Bangladesh (Courtesy - BGMEA).

Figure 3 shows the increasing trend of the export of readymade garments from Bangladesh to the developed countries of the world as compared to the total export of the country from 1983-84 to 2019-2020(Courtesy – BGMEA).

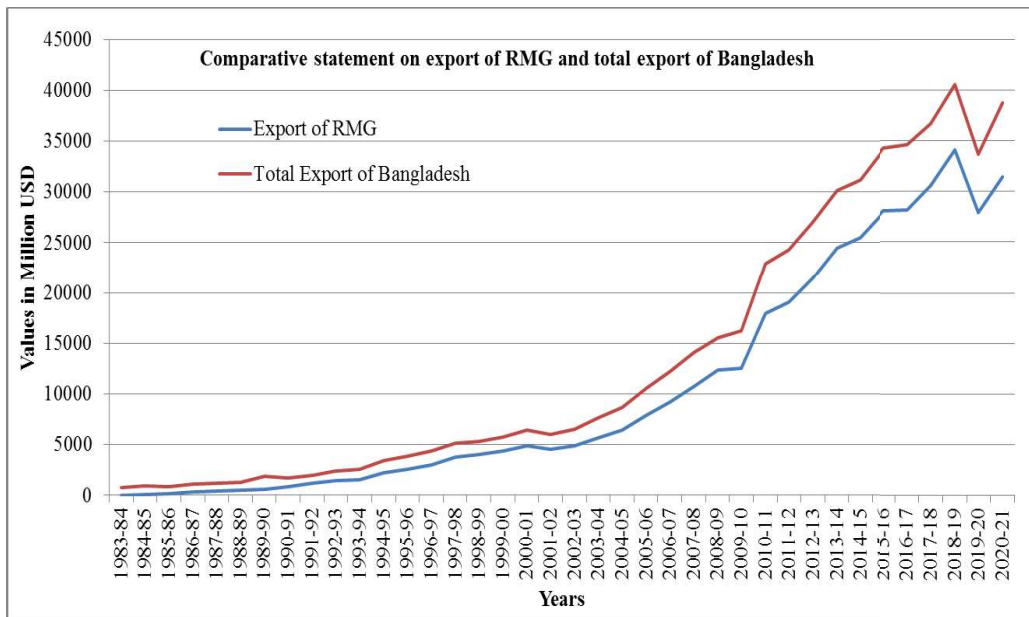


Figure 3: Relative report on the export of RMG & total export of Bangladesh.

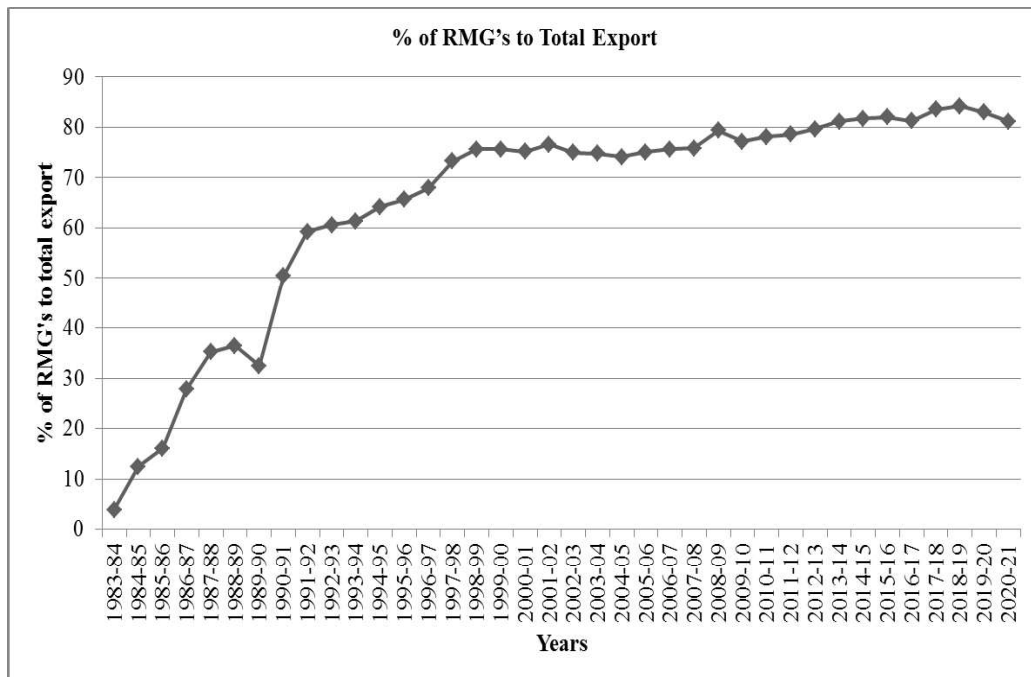


Figure 4: The percentages of RMG's to total export of Bangladesh from 1983-84 to 2020-2021.

From figure 4, it is seen that the export percentage of RMG to the total export of Bangladesh is increased from 1983-84 to 2020-2021. It is clearly observed that the export percentage of garments holds the major portion of the total export of the country (Courtesy – BGMEA).

supports and corruption, integrating and establishing industry 4.0 is complicated. Without rehabilitation of huge women-workers will be a social reform which in turn may be backfired. So, to choose the issue as it is the most vital sector of Bangladesh. The dominance of IR

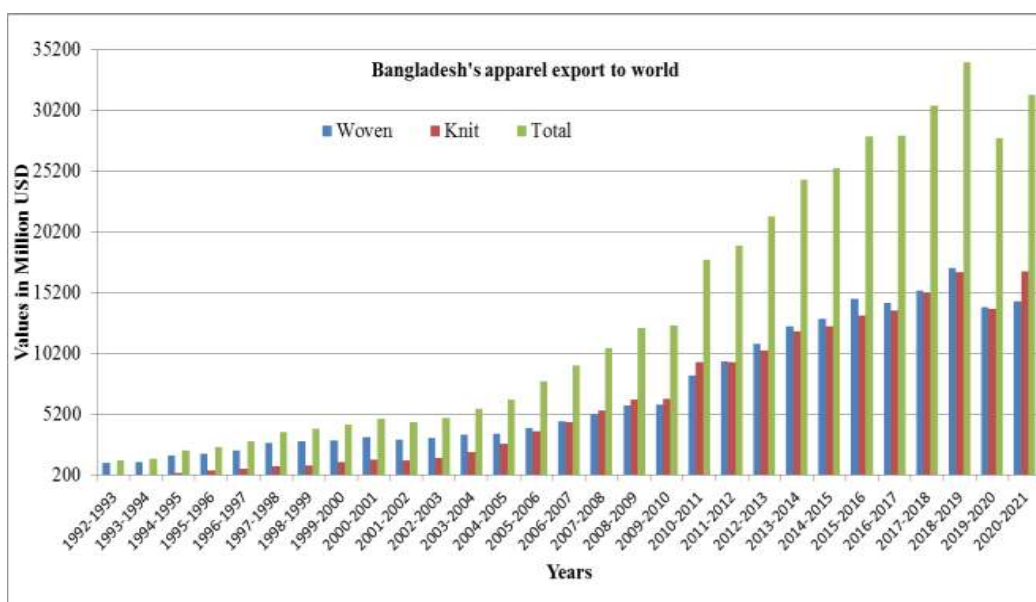


Figure 5: Bangladesh's apparel export to World.

It is observed from figure 5th at the apparel export is emerging since 1992-93 to till now (Courtesy -BGMEA).

4. Impact of Industry 4.0 in Bangladesh apparel sector

Bangladesh is now under the challenges of the 21st century global business environment. On the basis of the current scenario, the application of IR 4.0 in Bangladesh garment industries have to face some significant challenges such as: Garments business is very much competitive, cope up with the global market changing situation, minimize the cost with proper quality products, improve customer satisfaction, poor infrastructure like roads, uninterrupted electricity, the convenience of economy technical labor, costly installation of modern technologies, absence of government

4.0 will certainly be harmful to the economy, without the development of human resources, sensitive labour policies, and job-based education may be some of the challenges anticipated in the economy of Bangladesh.

However, there are some advantages of automation in apparel industries, e.g. shorter lead time, enhanced quality of the products, increase productivity, minimize human, and maximize work, more efficiency, less floor space, etc. Automation has already been introduced in some garments industries in different sections like cutting: auto cutting machine, auto fabric spreader, computer-aided manufacturing, auto arm cutting, laser cutting machine, etc. In sewing section zigzag stitch, cuff, collar, j-stitch, zipper, garbage to reduce main stitching line operation, cycle check machine can sew some of the particular area



speedy, embroidery machine with automation. These machineries have integrated computerized intelligence system which can operate according to commands.

Emerges Technique CAD, CAM system can improve and minimize the functions. ERP software may minimize the manpower. Artificial intelligence and 3D modeling technique in particular have gained popularity. In the beginning, it was just garments creation and testing the fit, but now also it is design and selling contribute to faster and more effective decisions, small carbon footprint and less fabric waste, sustainability, saving, energy and improve traceability.

As RMG has to depend on the backward linkage, so Spinning, Weaving, Knitting, and Dyeing of all categories of products should also be made with modern machinery, and where possible Balancing, Modernization, Rehabilitation, and Expansion (BMRE) may be done with state of the art machinery and equipment so that quality can be performed in an integrated manner like Quality management, Process control of all types of products from yarn spinning to finishing fabric can be monitored in an effective and efficient manner. The new equipment and techniques will give a bunch of benefits to the RMG sector.

5. Conclusion

The apparel industries of Bangladesh are standing at a cross road facing various challenges. Proper steps should be taken to overcome the challenges and to avail the opportunities in offering in plenty in the globalization. The establishment of the manufacturing settings with the elements of Industry 4.0 is crucial not only to increase the production of units but also to reduce the production costs. Product development by improving industry with modern state of art, machinery for timely shipment, value-added products, quality products, less lead time with strict compliance. It is very hopeful that

Bangladesh is the house of the highest number of green factories (highest numbers are Leadership in Energy and Environmental Design (LEED) certified which enhances with the careful images to be a sustainable partner in the globe. The technologies now emerging, of course have to the capacity to develop the apparel industry on its top. But for the implementation, the industry needs a more skilled workforce with technological knowledge.

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