



Leading in the Digital Age: The Perspectives of the Readymade Garments Sector of Bangladesh

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ABSTRACT

The prime objective of the research was to determine how the RMG sector is embracing digitization and its leaders are preparing for the digital age? So we investigated the influence of three variables- use of atomized digital machines, use of smart phones and apps, internet of things and what type of leadership style is needed for digital leadership. The present study used a sample of 50 RMG companies. Further, the variables' influence on digitization has been assessed through multiple factors leading to digitization by allotment of weightage for each factor. The findings in this paper supports two variables; use of automized digital machines and internet of things being significant whereas, use of smartphones and apps is insignificant. It implies that preparation for leading in the digital age remains limited which require incorporation at all levels. The paper leads to a research question for future researchers that despite being very much important theoretically, why uses of smart phones are non-significant in RMG sector? Limitations of the paper include the data which is specific to Bangladesh RMG industry, therefore it cannot be generalized, and further the economic meltdown due to COVID-19 pandemic might have influenced the results. The paper's prime contribution is based on the assessment of predictor variables and their influence that it makes in providing leadership in the digital age.

KEYWORDS

Ready Made Garments, Leadership, Digitization, Automation, Bangladesh.

INTRODUCTION

Volatility, uncertainty, complexity and ambiguity (VUCA), Industry 4.0, Smart Factory, Disruptive Changes, Fast Paced Innovations are buzzwords dominating today's literatures on technology and digitization. Transforming to digitization, organizations will have to heavily invest in building capabilities in data and connectivity, analytics and intelligence, conversion to the physical world, and human-machine interaction to get the most out of Industry 4.0 or apparel 4.0 (Oberer & Erkollar, 2018). The smart factories and the rise of drone era emphasize the use of sewbots in apparel manufacturing.

Apparel manufacturers are driven to adopt RFID technology with the expansion of both retail stores and the online business. Brands like Levi's, Zara, M&S, Walmart implemented the technology, Radio-Frequency Identification (RFID) tag supplied the brands to their manufacturers worldwide for item-level tagging. The RFID tag is sent to worldwide and to Bangladesh's factory, placed inside the security alarm, and attached to each apparel item. When the finished /packed products are shipped to brand's warehouse, the product information (such as the size, color, PO no, manufacturer id, country code of that particular item) are written into the RFID tag by encoding a unique identification (ID) number, and then the tag is connected to warehouse/ supply chain or inventory management software (Swedberg, 2014).

When an apparel item is sold, the RFID tag is removed using the RFID detacher that transmitted the product ID to the software system to update the inventory record, and deactivated eventually. The tags are collected and sent to retailers/store to remove all of the memory and then are shipped to factory for reuse. The tags are also used for tagging the returned products on the shop floor. This is example of digitization of apparel manufacturing.

Long before, in the 90s, we (RMG Bangladesh) have already adopted Enterprise Resource Planning (ERP) for production planning and monitoring, MIS -management information system for HR, pay rolls, attendance and finger print access controls for workers, facial or biometric access control for offices, MES for productivity etc.

The use of computer-aided manufacturing (CAD/CAM) tools have not only increased the precision level, reduced wastages but also enabled us to relate with the previous designs, proposed designs, and other references that can all be consolidated and compared using computers (Choi, 2016).

Digitization in apparel manufacturing is progressing in a fast paced, disruptive way. It is not only reducing the lead time, lowering the cost of manufacturing, lessening periodical maintenance by predictive maintenance, minimizing the time of machine breakdown and creating a synergistic environment of production with zero re-work. The modeling and simulation of sewing lines through batch process or a single piece flow enables the planner to find out accurate method and achieve zero change over time.

It is therefore, significant that we study the process of digitization in RMG sector of Bangladesh and find out our present status with a view to advancing to the next level to remain competitive in global market.

The purpose of the article is to explore and explain the terms digital leadership and the leadership in the digital age and relate it to the RMG sector of Bangladesh. The aim is simple: to find out how are we (RMG) preparing for the leadership in the digital age in RMG sector of Bangladesh?

LITERATURE REVIEW AND DEFINITIONS

Cyber-physical systems (CPS): CPS is a complex engineering system that integrates physical, computation and networking, and communication processes. CPS can be illustrated as a physical device, object, equipment that is translated into cyberspace as a virtual model (Lee, 2015)

Smart Phones: Smartphones are at the heart of all the recent trends in IoT and machine learning therefore, every day we see innovations that center on the device as a controller, a system dashboard, and a security access key, or a combination of all three, the smartphones are placed as the primary human machine interface (HMI) (Goethals et al., 2003).

Internet of things (IoT): IoT can be defined as communication among devices, machines, and equipment with their virtual personalities and capabilities obtained as a result of technological advances. These physical systems have become smart and can automatically conduct some industrial operations as a result of these connections (Görçün, 2018). The IoT is a widely used term for a set of technologies, systems, and design principles associated with the emerging wave of Internet-connected things that are based on the physical environment (Holler et al. 2014).

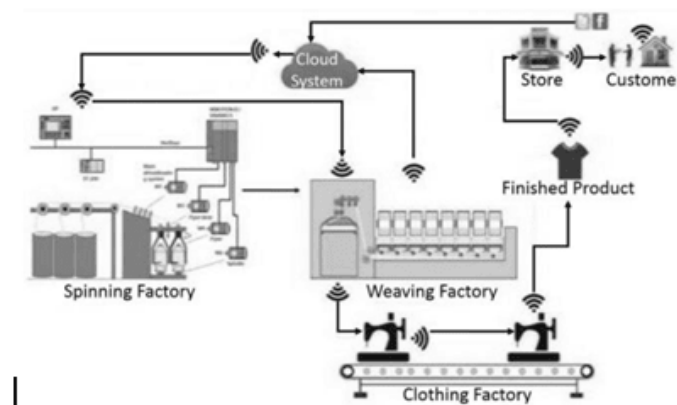


Figure 1. An Example of IoT in RMG (Adapted from Ömer Faruk Görçün, 2018).

Digital Leadership: Digital leaders can be defined functionally by their contributions to the transition toward a digital platform. These include awareness building, resource mobilization, operational leadership and structural leadership. As digital leaders, we need to evolve faster than the pace of change; we need to hone our skills and capabilities to constantly ride on top of the changes and innovations (Hensellek, 2019).

We must distinguish between two related but different leadership categories. The two styles of leadership are closely related - many leadership innovations originated in the core ICT sectors and diffused from there. The most inclusive is "leadership in the digital age", which refers to leadership in any institution or sector embedded in the broader transitions toward a more knowledge intensive digitalized society. The

second, “digital leadership” refers to leadership in the core sectors of the ICT society – the three ‘C’s of computing, communications and content (broadcasting and print), and now multi-media.

The Process of Transformation

The RMG industry undergoing a revolution which includes the digitization of apparel production processes ranging from concept to post-retail. Bangladesh RMG is adopting the 'Apparel 4.0' concept and this will enable the manufacturers to monitor and automate the entire production process with complete supply chain transparency. Apparel 4.0 has major applications in smart clothing, robotics, simulation, industrial IOT, augmented reality, Machine-to-Machine (M2M) communication in knitting machines, smart factory, 3D printing, smart fabrics and AI-infused Industrial ERP (enterprise resource planning) etc.

Neighbouring countries of Bangladesh such as India, China and Vietnam are also rapidly implementing the Apparel 4.0 technologies in their factories. Raymond from India has started using the sewbot technology. Chinese garment manufacturers are introducing the smart clothing, augmented reality, and 3D printing in their factories. Vietnam has significantly developed Radio Frequency Identification Device (RFID), additive manufacturing and ERP¹.

To contribute to improving efficiency, transparency and accountability of RMG in Bangladesh, mapped in Bangladesh (MiB) has been undertaking a 4-year research initiative by Centre for Entrepreneurship Development (CED) of BRAC University [CED-BRACU] and BRAC. The implementing organisation is aiming to map the RMG industry across all garment-producing districts in the country. MiB's design and implementation are in response to a lack of essential industry data, such as: how many export-oriented factories exist in the country, gender ratio of workers employed there, what kind of products are produced and which brands work with them, etc., among other relevant information.²

Since Industry 4.0 or apparel 4.0 vis a vis digitization of garments factories are in its initial phase, it is unadvisable to pursue it blindly and exaggerate its significance for the manufacturing industry. Most textile manufacturing, lacking innovation, is at mid-low end of the value chain. It is feasible to consider the ROI for both the new upgrading and the basic construction. Several issues must be resolved, such as setting and implementation of the industry standard, device protocol and information sharing scheme (Chen & Xing, 2015).

Leadership Styles in Digital Age

Leadership and managers play a crucial role in firms' innovation efforts (Damanpour, 1991; Smith & Tushman, 2005; Wrede & Dauth, 2020). Digital leadership is based on innovations and rapid changes. The most important is to remain updated on changes that affect the firm’s competency, innovations that need to be incorporated to remain competitive. Research findings on digital leadership style indicated that it is highly impactful in transforming organizations and employee-based involvement and input played a critical role in the success of the change effort. the development of a digital culture is launched by top

¹ (www.fibre2fashion.com).

² (<https://www.thefinancialexpress.com.bd/views/analysis/digital-initiative-to-promote-rmg-good-governance-1594402818>).

managers and leaders actively shape the transformation by building relationships with various and diverse stakeholders (Cortellazzo et al. 2019).

Where Do We Stand ?

The literatures suggest that the digital transformation progresses in phases. It begins with the simple conversion of information from an analog into a digital format (i.e., 'digitization') (Loebbecke & Picot, 2015), changes into the use of digital technologies to transform existing business processes (i.e., 'digitalization') (Li, Nucciarelli, Roden, & Graham, 2016), and finally the 'digital transformation' (Pagani & Pardo, 2017) affects firms in their entirety, changes and adjustments will be observable at different levels of the organization (Hausberg et al., 2019).

The digital transformation is predominantly relevant to RMG sector, and China is leading in this transformation with new innovations, use of sewbot, manufacturing smart clothes, whereas India, Vietnam and Bangladesh have started the process which is very slow and to some extent limited to certain processes only.

Understanding RMG Manufacturing

Departments in garment manufacturing unit



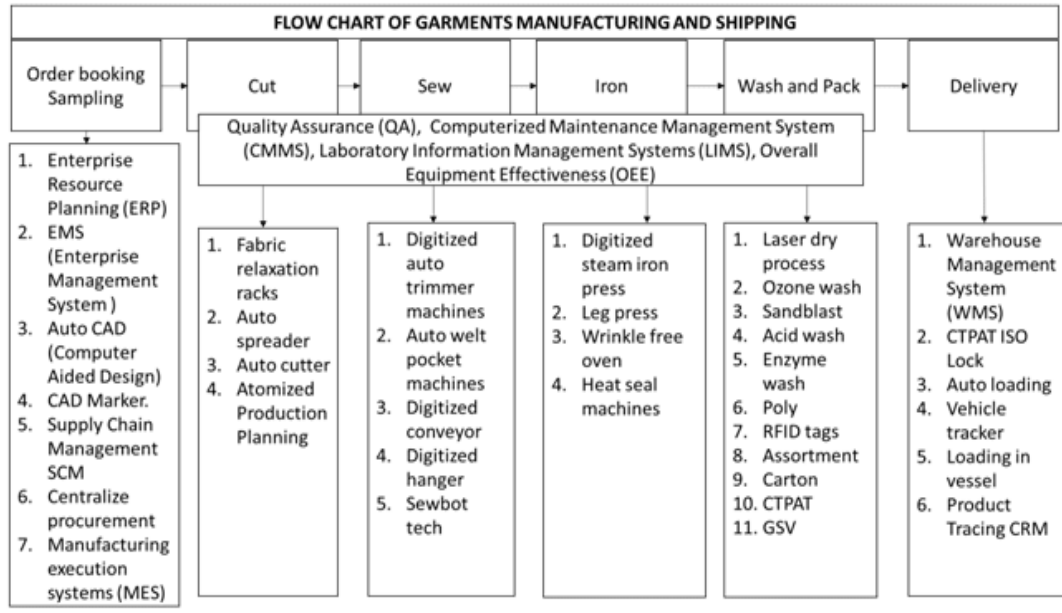


Figure 2. FLOW CHART OF RMG (Prepared by author)

These factors are to be used to measure the maturity of digitization in an RMG factory.

RESEARCH QUESTIONS AND CONCEPTUAL FRAMEWORK

From the literature review we have constructed the conceptual framework and incorporated the factors within it.

- What is the state of digitization in the RMG sector?
- How the RMG leaders are preparing for digital leadership?

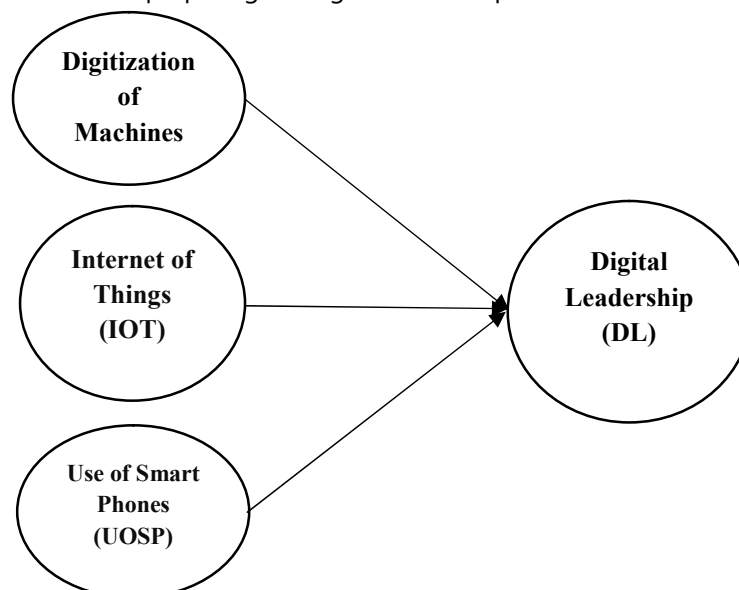


Figure 3. Conceptual Framework

METHODOLOGY

We collected primary data from 50 RMG factories by visiting them and talking to the owners, managers regarding their digitization, automation and innovation. The digitization factors had been filtered through to reach to the most relevant ones in RMG sector, we collected data on following factors:

1. Use of auto machine
2. AR
3. Use of RFID
4. Use of Smart Phones and Apps
5. AI
6. Cloud Computing
7. Big Data
8. M2M Communication
9. VR
10. Automation, modeling and simulation
11. Automation in production of yarns, woven, and knitted fabrics
12. Automation in fabric inspection
13. Automation in spreading and cutting
14. Computer-aided design—garment designing and patternmaking
15. Automation in quality monitoring of fabrics and garment seams
16. Use of advanced tools and equipment in industrial engineering
17. Advancements in production planning and control
18. Mobile Technologies
19. 3D Printers
20. CRM and Product Traceability

After collecting data, we put this into a model and found out the maturity level of digitization in the RMG sector of Bangladesh.

The model is:

$$M_D = n + i * g$$

M_D = Maturity Dimension

n = Number of Factors

i = number of maturity items

g = weightage

There is total 20 factors and 4 maturity items, and the maturity item each weightage being, 5.

A factory having 16 factors incorporated and 2 maturity items will score as:

$$M_D = 16 + 2 * 5 = 26 \text{ out of total score available } 40.$$

A hundred percent score will be a matured level, while a score within or below 60% is considered level 1, 80% is level 2, and level 3 is matured one.

There are total 20 general factors and 4 maturity factors, maturity factors are the most advanced forms of digitization.

RESULTS

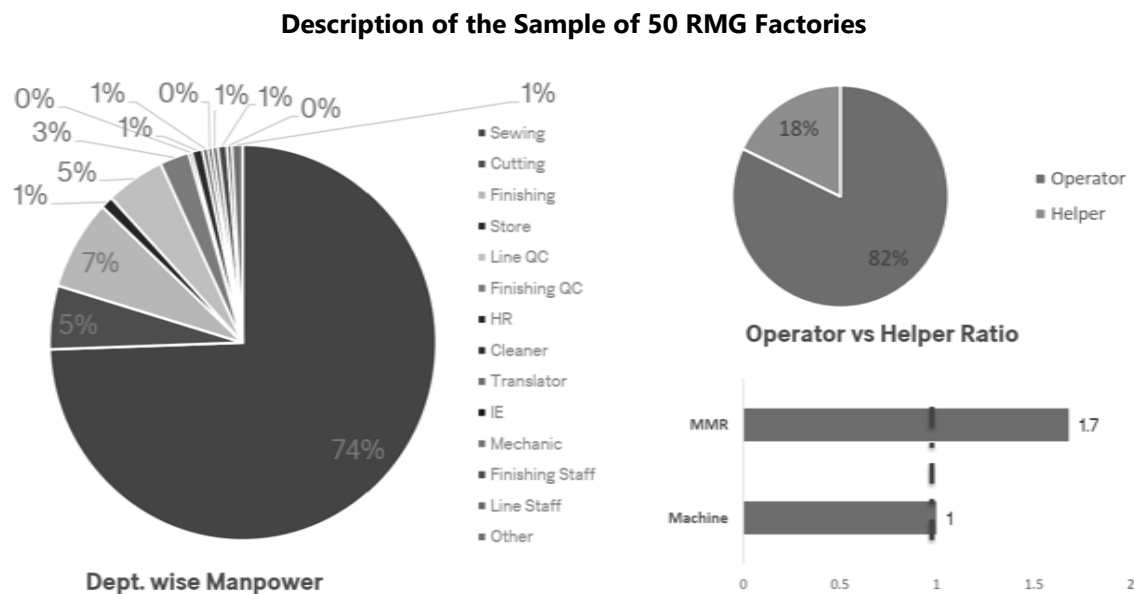


Figure 4 MMR

Man & Machine Ratio

A RMG factory with limited or no automation is having a Man to Machine Ratio (MMR) higher than 1:2.2 that means for one machine there are 2.2 Men employed. With medium automation it becomes 1:1.8 or 1:1.7. The automation and digitization reduce and MMR up to 1:1.4. It is well understood the more manpower employed is the more of cost of manufacturing.

The RMG sector employs direct manpower, who is behind machines, and needle works and adds value directly to the productivity. These are the operators, helpers and ironmen. Indirect support manpower like quality assurance staffs, industrial engineers etc. add value indirectly. Other support or admin staffs are considered as non-value add manpower. Though in MMR we calculate all held in strength, the more machines we can run and reduce support staffs the better the MMR. A lower MMR will lead to a greater productivity and reduce cost of manufacturing, digitization and automation allows to reduce support staff and increase the standard minute values produced thus shorten the lead time, change over time and nonproductive times.

Tabulated form of Result

Serial	Factor/Digitization	Percentage	Remarks	Weightage
1	Use of auto machine	100		
2	AR	0		
3	Use of RFID	60		
4	Use of Smart Phones and Apps	8		5
5	AI	70	1. Use of sensor-based conveyor belt, 2. Use of sensor-based hanger, Use of Smart office to turn off lights, water, HVAC system, 3. Use of auto CAD machines	
6	Cloud Computing	4		
7	Big Data	0		5
8	M2M Communication	4		5
9	VR	0		5
10	Automation, modeling and simulation	30		
11	Automation in production of yarns, woven, and knitted fabrics	40		
12	Automation in fabric inspection	50		
13	Automation in spreading and cutting	50		
14	Computer-aided design—garment designing and patternmaking	98		
15	Automation in quality monitoring of fabrics and garment seams	64		
16	Use of advanced tools and equipment in industrial engineering	90		
17	Advancements in production planning and control	80		
18	Mobile Technologies	4		

19	3D Printers	0	
20	CRM and Product Traceability	2	

Table 1: Results

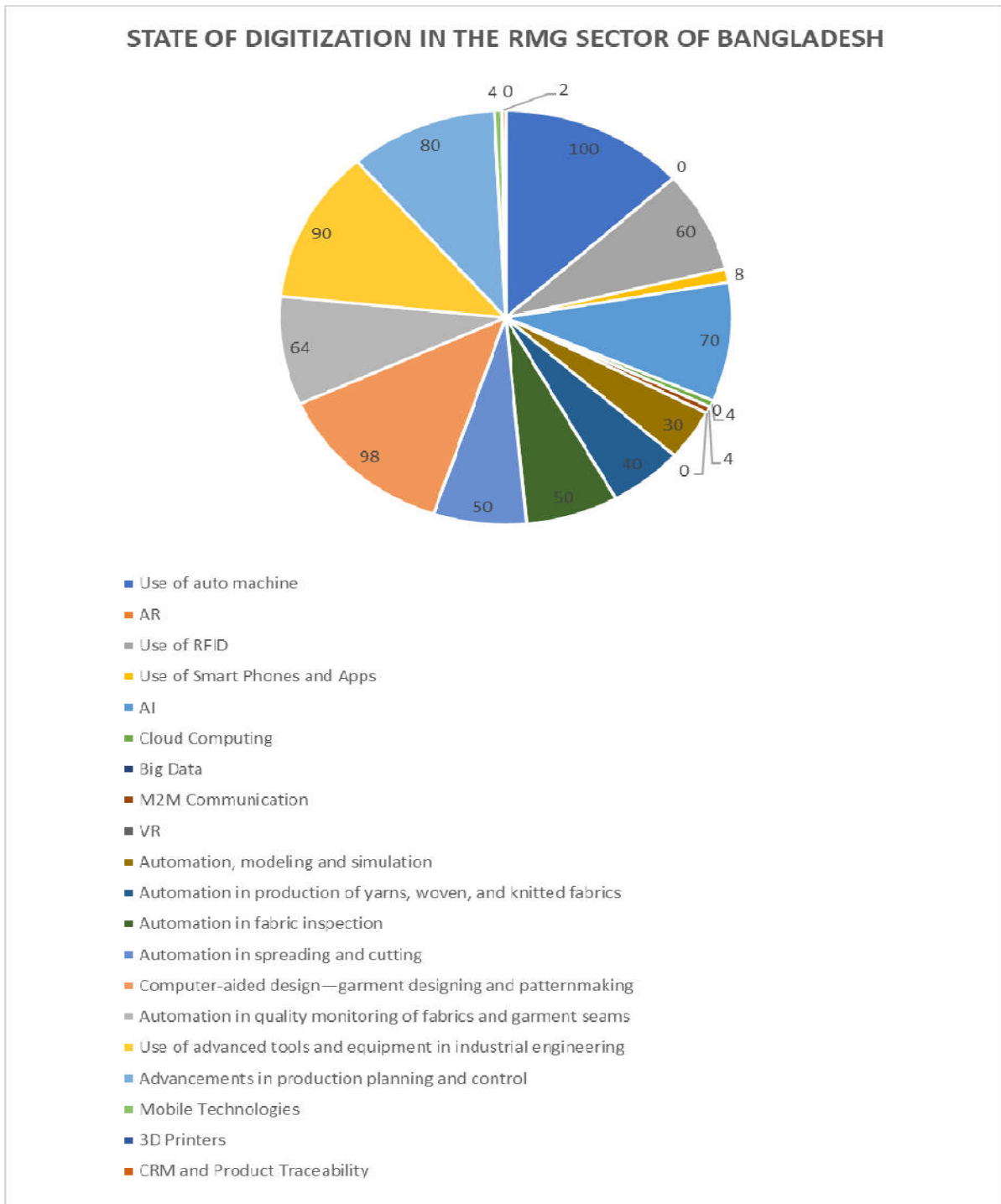


Figure 5 Results

DISCUSSION AND CONCLUSION

Modern companies, today, connect information and communication technology in production and operational process (Dewan and Kraemer, 2000; Eason, 2005). In the advanced stage of the industry, however, this will be controlled and documented around the entire supply chain from the inception or idea of a product, research and development, production, use, and maintenance to recycling (Roth, 2016).

Bangladesh RMG has digitized its Global Security Verification (GSV) and Customs-Trade Partnership Against Terrorism (CTPAT) through CCTV cameras, IP cameras and RFID and through use of ISO locks and real time product tracing. However, product design remains limited to auto CAD (computer aided design), the 3D modelling and use of 3D printers are yet to be incorporated.

The process of manufacturing is automated and to some extent digitized isolated, for example the cutting process is automated but not linked with the input process. The Digitized sewing process is also working stand alone and not linked to packing. The quality assurance is more of manual then digitized ones.

From the result of the model, and the tabulations we can argue that UOSP (Use of Smart Phones is limited to information sharing through apps like WhatsApp, Viber or other apps like Skype. The use of remote apps like Zoom, Meeting, etc. facilitate the COVID time work from home meeting, however apps with dedicated dashboards and interface connected to processes are yet to be introduced.

The result further confirms that digitization of machines has advanced though not incorporated in a seamless machine to machines communication, 80% of the factories digitized the manufacturing process department wise. Similarly, the IoT is limited to cloud computing acting as a backup server only.

In demand forecasting, decision making, the most critical information is historical data. Datasets of both products and related fast fashions are useful. Then, there must be an efficient tool to help provide reliable and useful forecasts. However, the apparel sector has not yet started using the Big Data concept for demand forecast or decision making.

Leadership styles are essential to any organization and can drive successful results; however, not all organizations can employ the appropriate styles for their existing business practices, while others utilize leadership styles to align organizational needs and required changes, the appropriate leadership style make this transition easier (Holten & Brenner, 2015) but Bangladesh RMG leaders lacked some of the technical knowledge required to lead digitization project.

We can conclude that automation in RMG is in intermediate/level 2 stage, however, the digitization of RMG is at beginner's /level 1 where use of smart phones are scarce, only 4% of the studied factories started using smart phones only to track and monitor productivity but yet not integrated / interfaced with IoT.

Implications for Practice and Further Research

The implication of the study is to measure the maturity of the digitization through the model explained in methods.

This study generates following questions for further research:

1. Is the manufacturing set up matured enough for digital transformation?
2. Will the digital solution meet company objectives?
3. How are digital transformations strategized?
4. How digital transformations prioritized?
5. What is the estimated time for ROI/break even cost analysis?

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