Journal of Business and Management Studies (JBMS)
www.jbms.one
ISSN: 2709-0876

Relationship with Industry 4.0 and Supply Chain Management System of FMCG

Manjurul Hossain Reza
Ph.D. Research Fellow, Limkokwing University of Creative Technology, 1/1, Innovasi, Jalan Teknokrat, Cyberjaya, Malaysia
Corresponding Author: Manjurul Hossain Reza, E-mail: reznman@gmail.com

ARTICLE INFO

Received: August 21, 2020
Accepted: October 03, 2020
Volume: 2
Issue: 2

KEYWORDS

FMCG, industry 4.0, Customer, supply chain management

ABSTRACT

Supply chain management optimizing industrial operations to increase both speed and efficiency. Both speed and efficiency are crucial to increase service quality and ensure product delivery at the earliest time. There is increasing use of automation, data processing and exchange, cyber-physical systems, Internet of things and cloud technology in the industry. Modern factories undergo a constant transformation, which has an impact not only on the organization of manufacturing activities but also on the functioning of supply chains. Proper supply chain management practice is important for the First Moving Consumer Goods (FMCG) industry because customers will choose the company that meets their needs fastest. It is also important to get competitive advantages in the market with effective supply chain management under industry 4.0. This paper explores the challenges for modern supply chains that arise as a result of the fourth industrial revolution. It attempts to answer the question to what extent the Industry 4.0 affects the organization of products and information flows in supply chains.

1. Introduction

Supply chain as a network that encompasses a lot of business activities on different levels, is very receptive to the least change (Dujak, Franjkovic, & Sebalj, 2014). The last six years have involved further revolutionary changes in industry, referred to as 'the Fourth Industrial Revolution'- Industry 4.0. Everywhere people are connected together in social media, and this is transferred to the field of industry, where machines, items and employees get linked into a network in virtual reality by means of IoT (Internet of Things) technology (Szozda, 2017).

The relationship between the buyer and vendor is very vital in the supply chain performance of a company. The optimum strength should be observed for the relationship of buyer and vendor. For gaining competitive advantage and improving the organizational performance, effective supply chain management is must. Procurement, production and distribution the three fundamental matters of supply chain management (Ghosh, 2015). The Fourth Industrial Revolution is associated mainly with factories and it is a far broader notion, referring also to other areas of organization activities, such as, global supply chain management. This concept goes beyond a single company and is carried over to a network of links between organizations where data are integrated in a cloud and processes are organized along a supply chain in virtual space (Szozda, 2017).

The Fast Moving Consumer Goods (FMCG) industry is described as the largest industry in the world (Agigi, Niemann, & Kotzé, 2016). Increasingly, supply chain management is being recognized as the management of key business processes across the network of organizations that comprise the supply chain (Jayaram, 2016). In the transformation of industry 4.0, the foundation of technology progresses are sensors, machines, work pieces, and IT systems will be connected along the value chain beyond a single enterprise (Rüßmann et al., 2015).

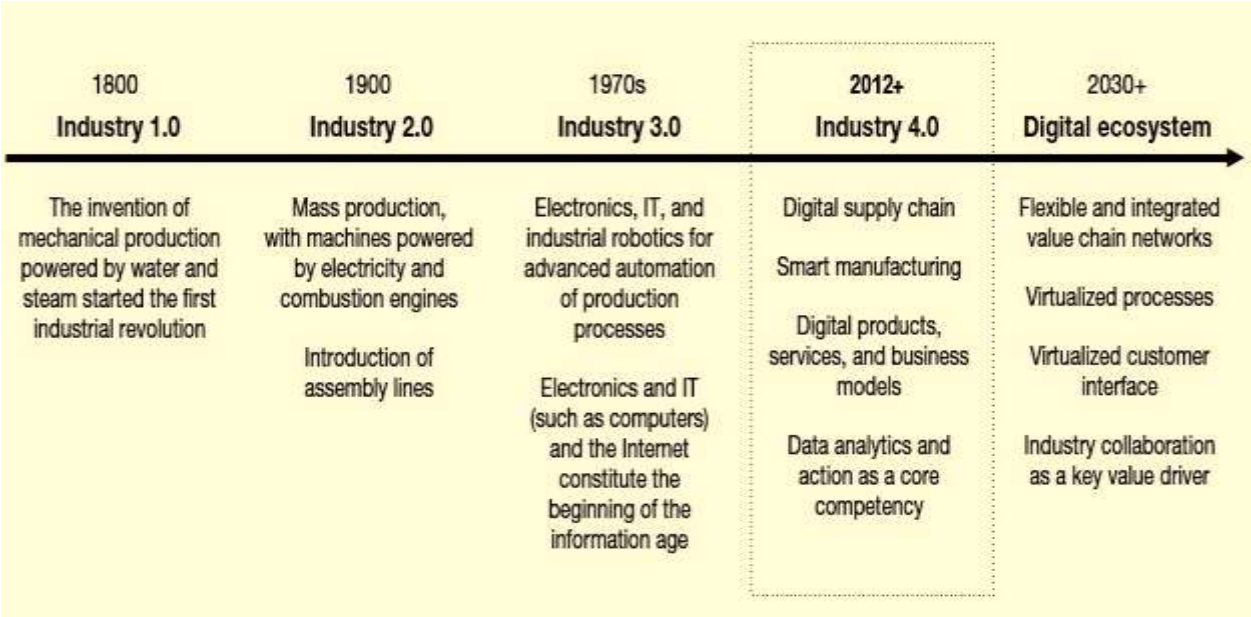
2. Industry 4.0

The term Industry 4.0 was initially invented by the German government, and it described the organization of production processes based on technology and devices autonomously communicating with each other along the value chain. Henning Kagermann, the head of the German National Academy of Science and Engineering, exactly in 2011, he used the term Industry 4.0 to describe a proposed government-sponsored industrial initiative (Maslarić, Nikoličić, & Mirčetić, 2016).

The concept was derived from increase in production computerization where physical structures are integrated into information networks and as such it includes both horizontal and vertical integration of a large number of systems at all levels which lead to start to end solution (Ghosh, 2015). A transformation in production and automation was brought on first by steam and water power (Industry 1.0), then by electrification (2.0), and more recently by the digital computer (3.0). Industry 4.0, digitization, is about companies orienting themselves to the customer through e-commerce, digital marketing, social media, and the customer experience (PwC, 2016).

The term Industry 4.0 refers to the combination of several major innovations in digital technology, all coming to maturity right now, all poised to transform the energy and manufacturing sectors. These technologies include advanced robotics and artificial intelligence, sophisticated sensors, cloud computing, the Internet of Things (IoT), data capture and analytics, digital fabrication (including 3D printing), software-as-a-service and other new marketing models, smartphones and other mobile devices, platforms that use algorithms to direct motor vehicles (including navigation tools, ride-sharing apps, delivery and ride services, and autonomous vehicles), and the embedding of all these elements in an interoperable global value chain, shared by many companies from many countries (Hietschold, Reinhardt, & Gurtner, 2014).

Figure 1: The Long Road to Industry 4.0



Source: PwC Network

Industry 4.0 includes automation, industrial internet of things (IIoT), data sharing and cloud computing and it has mainly the following components (Jayaram, 2016):

Communication: The capacity of machines, sensors, and individuals to communicate with each other by means of the IoT or the Internet of People (IoP).

Transparency: The capacity of data frameworks to make a virtual version of the physical world by improving computerized models with sensor information collected physically.

Technical Guidance: The capacity of digital systems to support people by learning from the collected information and make decisions and take care of critical issues independently. It is also the capacity of digital systems to perform tasks.
Independent choices: The capacity of digital systems to make choices itself and work independently.

Figure 2: Nine Technologies in the Era of Industry 4.0

Source: Boston Consulting Group (BCG)

Nine advances in technology that form the foundation for Industry 4.0 are already used in manufacturing and they will transform production: isolated, optimized cells will come together as a fully integrated, automated, and optimized production flow, leading to greater efficiencies and changing traditional production relationships among suppliers, producers, and customers, as well as between human and machine. Industry 4.0 also promotes the use of big data, IoT and Artificial Intelligence (AI) as one. This revolution envisages an environment whereby smart machines can communicate with one another, not only to enable the automation of production lines but also to analyze and understand a certain level of production issues and, with minimal human involvement, to solve them (Tjahjono, Esplugues, Ares, & Pelaez, 2017).

3. Supply Chain Management

Supply Chain Management was a term invented by Keith Oliver, a consultant belonging to the firm Booz Allen Hamilton, in the year 1982, to describe the overall process of planning, implementing and controlling what goes on at the supply chain in order to satisfy customers' needs in a quick and efficient manner. Supply Chain Management is the integrated planning, co-ordination and control of all business processes and activities in the supply chain to deliver superior consumer value at less cost to the supply chain as a whole whilst satisfying requirements of other stakeholders in the supply chain (Vorst, 2004). Supply Chain Management is the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders (Jayaram, 2016).

Supply Chain Management is an integrated approach beginning with planning and control of materials, logistics, services, and information stream from suppliers to manufacturers or service providers to the end client; it represents a most important change in business management practices (Lu, 1998). Supply Chain Management activities represents a conscious effort by the supply chain firms to develop and run supply chains in the most effective & efficient ways possible (Higginson, 2014). Supply chain activities cover everything from product development, sourcing, production, and logistics, as well as the information systems needed to coordinate these activities (Sobuj, Ray, Basak, Fatema, & Seddiqe, 2016).

In the following ways Industry 4.0 impact on the supply chain management:

- **Smart factories:** Automated and flexible manufacturing processes that are integrated with customers and business partners in support of product lifecycle changes-will impact current factory layouts.

- **The Internet of Services:** Connecting production facilities across geographies and company boundaries to create virtual production capabilities will create new business models and disrupt current supply chain designs.
- **Advanced analytics:** Capitalizing on big data and predictive analytics- to drive flexibility at the process level, not just production lines or factories- will put more pressure on organizations to use production data to its fullest.
- **Focus on the knowledge worker:** The rise of smart machines will not see the demise of the knowledge worker- rather, this increasing complexity demands supply chain professionals expand their problem solving and systems engineering skills.

4. Fast Moving Consumer Goods

Fast Moving Consumer Goods (FMCG) are commonly named as consumer packaged goods. Items in this category include all consumables people buy at regular periods. The most common in the list are toilet soaps, detergents, shampoos, toothpaste, shaving products, shoe polish, packaged foodstuff, and household accessories and extends to certain electronic goods. These items are meant for daily of frequent consumption and have a high return (Sobuj et al., 2016). The FMCG Industry is on a high growth curve with the overall demand expected to multiply over the next decade. This high growth is most likely to be accompanied by significant structural shifts such as changing customer preferences, emergence of modern retail dimensions, growing rural spend tendency (Bala & Kumar, 2011). To ensure success, FMCG manufacturers are adopting collaborative logistics solutions that deliver products to stores faster and more cost-effective.

5. Supply Chain System in FMCG

Industry supply chains generate innovative ideas and act as benchmarked frameworks for other industries, because of their high volumes of product flows, close interaction with their customers, less complex manufacturing processes and the dominance of retailers. Supply Chain Management in FMCG consists of suppliers, manufacturers, wholesalers, retailers and the customers as well. When all of the components perform tasks in a coordinated manner, a highly efficient global supply chain is formed. Each of the components of a global supply chain may be located in different geographical locations.

Figure 3: Supply chain activities in a consumer goods supply chain

Source: (Bala & Kumar, 2011)

Supplier: The party who supplies raw materials needed for the production of goods. Often they are supplied in large quantity based on the requirement of the manufacturer.

Manufacturer: These are mainly enterprises who convert raw materials into finished goods. Manufacturer follows a production flow of logistics, marketing, finance, research and development, production and purchase. All the team's coordinate with each other during the manufacturing process.

Wholesaler: They mostly contain the agencies which purchase the finished goods in bulk from the manufacturer and distribute to the local retailers. Wholesaler keeps a wholesale price.

Retailer: They procure the goods from distributors and sell it to the customers at retail price. Customers fulfil their needs and requirements from retailers.

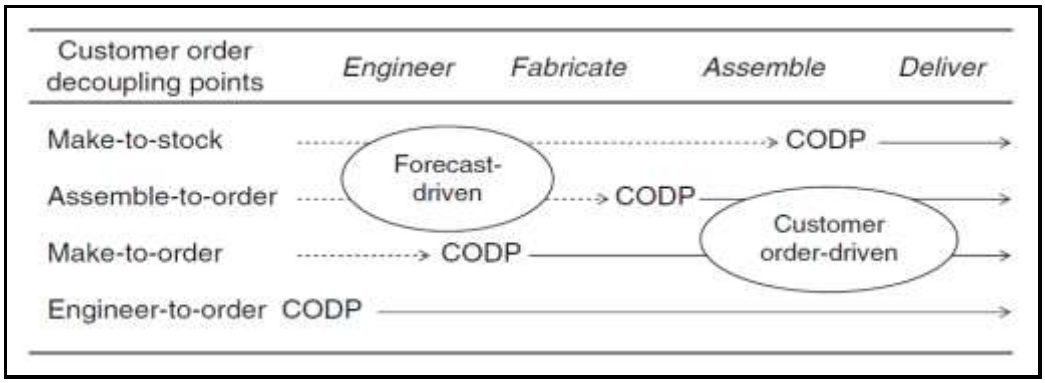
Customer: The group of people who consumes the product frequently. In a global supply chain, enterprises possess international customers and products need to be shipped to them.

6. Customer Order Decoupling Point in FMCG

The customer order decoupling point (CODP) is an important factor in the design and management of manufacturing operations as well as supply chains. The CODP is the point in the material flow where the product is tied to a specific customer order and the basic choices being make-to-stock, assemble-to-order, make-to-order, and engineering-to order.

From the supply chain perspective, there is typically one dominant CODP along the material flow of the value chain. From a company perspective, the CODP can be positioned inside their manufacturing operations or it can be positioned at the suppliers (first tier or even further upstream in the value chain), at the interface with the supplier (raw material inventory), at the border towards the customers (at some finished goods inventory), or even further downstream in the supply chain.

Figure: 4 Customer Order Decoupling Points (CODP)



Source: Jan Olhager

a. Upstream of CODP

- Goods flow control upstream of the CODP is forecast-driven
- form of "push" where the release of work is governed by forecasts &
- assumptions about status of shop floor
- Lead Time increases from M-T-S to E-T-O

b. Downstream of CODP

- Activities in the goods flow are planned and controlled based upon
- actual customer orders
- Order-driven being equivalent to “working in pull flow"
- Lead time impacted is impacted by customer

c. Make-to-stock (MTS) firms: Firms that serve customers from finished goods inventory. It includes all options regarding keeping inventory in the distribution system; either at distributors, wholesalers or retailers. Product is produced to stock with respect to the form.

d. Assemble-to-order (ATO) firms: Firms that combine a number of pre-assembled modules to meet a customer’s specifications. A primary task is to define a customer’s order in terms of alternative components since these are carried in inventory

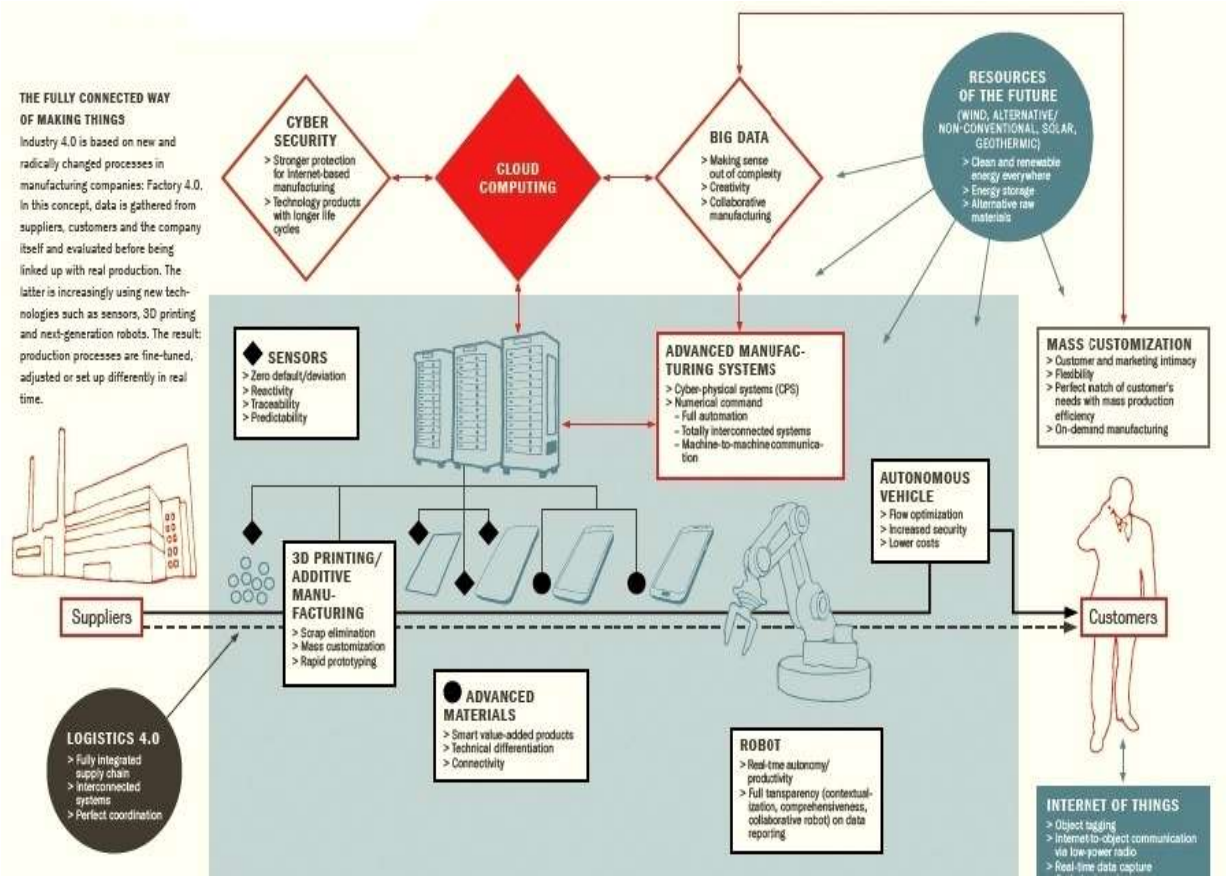
e. Make-to-order (MTO) firms: Make the customer’s product from raw materials, parts, and components. It is selected for special products with wide range and low individual product volume per period.

f. Engineer-to-order (ETO) firm: Firm that will work with the customer to design and then make the product.

7. Future FMCG Supply Chain Management System

Industry 4.0 is bringing new functions that will change the rules of the game for the industry players. The development will proceed at different rates in different industries in supply chain management system. Industry 4.0 brings more freedom and flexibility into the production process. So it will become possible to create FMCG products according to customer needs at relatively low marginal cost.

Figure 5: Future Supply Chain of FMCG

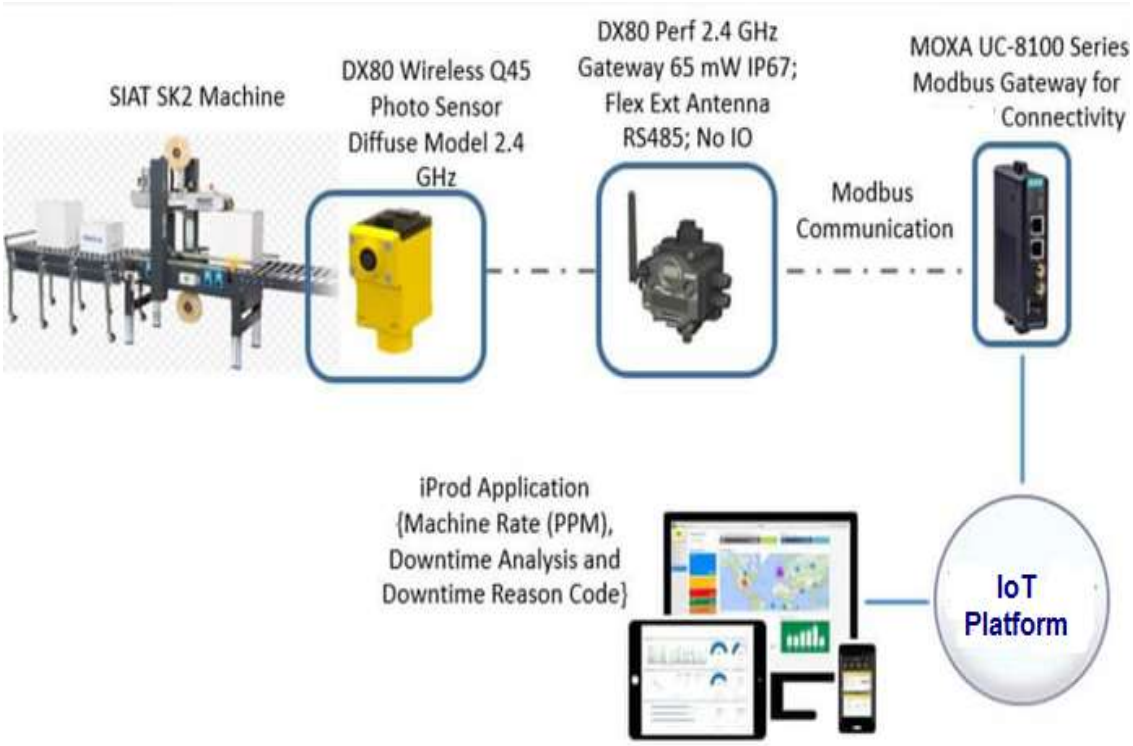


Source: Ronald Berger

The future system is fully connected way of making things. Industry 4.0 is based on new and radically changed processes in manufacturing companies: Factory 4.0. In this concept, data is gathered from suppliers, customers and the company itself and evaluated before being linked up with real production. The latter is increasingly using new technologies such as sensors, 3D printing and next-generation robots. The result: production processes are fine-tuned, adjusted or set up differently in real time. Sensors system provides zero default/deviation, reactivity/respond, certainty. Advanced manufacturing systems consist on cyber-physical systems (CPS), Numerical command, full automation, totally interconnected systems, and Machine-to-machine communication.

Logistic 4.0 is fully integrated system to supplier to customer with interconnected and perfect coordination. 3D printing plant can become economically viable and competitive in a high-cost country by being less sensitive to labor costs while still providing the proximity necessary for affordable personalization. Robotic system fully appears where will exists real-time autonomy and productivity, full transparency on data reporting. Customers depends on Internet of Things of Internet (IoT) for communication via low power radio, real time data capture, optimize stocks, and reduced time and wastage. Today, physical machine and tooling suppliers harvest the biggest margins with their industry clients. But in a cyber- physical system world, these suppliers will lose importance. Instead, suppliers of sensors, IT and software might take their place in Industry 4.0.

Figure 5: Future IoT Based Packaging System



Source: Datonis

The benefit of IoT based packaging system are packed accurate and real time rate for boxes and identify accurate downtime pockets and reason for the same.

8. Conclusion

As the collaboration between suppliers, manufacturers and customers is crucial to increase the transparency of all the steps from when the order is dispatched until the end of the life cycle of the product. It is therefore necessary to analyze the impact of industry 4.0 on the supply chain as a whole. From the analysis performed, it can be seen that the implementation of certain technologies, such as virtual and augmented realities, 3D-Printing and simulation, results will all result in opportunities. On the other hand, big data analytics, cloud technology, cybersecurity, IoT, robotics, drones and nanotechnology, and business intelligence could be opportunities for the organizations. Lot of clear benefits can be identified from the implementation of Industry 4.0. The most relevant benefits are increased flexibility, quality standards, transparency, efficiency and productivity. This will enable mass customization, allowing companies to meet customers' demands, creating value through constantly introducing new products and services to the market. Moreover, the collaboration between machines and humans could socially impact the life of the workers of the future, especially with respect to the optimization of decision making.

References

[1] Agigi, A., Niemann, W., & Kotzé, T. (2016). Supply chain design approaches for supply chain resilience: A qualitative study of South African fast-moving consumer goods grocery manufacturers. *Journal of Transport and Supply Chain Management*, *10*(1), 1–15. https://doi.org/10.4102/jtscm.v10i1.253

[2] Bala, M., & Kumar, D. (2011). Supply chain performance attributes for the fast moving consumer goods industry. *Journal of Transport and Supply Chain …*, 23–38. https://doi.org/10.4102/jtscm.v5i1.19
[3] Dujak, D., Franjkovic, J., & Sebalj, D. (2014). The Impact of Retail Ready Packaging on FMCG Supply Chain Members The Impact of Retail Ready Packaging on FMCG Supply Chain Members, (Novembro).
[4] Ghosh, D. (2015). Supply chain length estimation : A study on FMCG companies, *1*(13), 726–730.
[5] Hietschold, N., Reinhardt, R., & Gurtner, S. (2014). Measuring critical success factors of TQM implementation successfully-a systematic literature review. *International Journal of Production Research*, *52*(21), 6254–6272. https://doi.org/10.1080/00207543.2014.918288
[6] Higginson, J. K. (2014). Article information : https://doi.org/http://dx.doi.org/10.1108/MRR-09-2015-0216
[7] Jayaram, A. (2016). Lean six sigma approach for global supply chain management using industry 4.0 and IIoT. *Proceedings of the 2016 2nd International Conference on Contemporary Computing and Informatics, IC3I 2016*, 89–94. https://doi.org/10.1109/IC3I.2016.7917940
[8] Lu, D. D. (1998). *Fundamentals of Supply Chain Management*. *Journal of the Royal Society of Medicine* (Vol. 91). https://doi.org/10.1177/014107689809101016
[9] Maslarić, M., Nikoličić, S., & Mirčetić, D. (2016). Logistics Response to the Industry 4.0: The Physical Internet. *Open Engineering*, *6*(1), 511–517. https://doi.org/10.1515/eng-2016-0073
[10] PwC. (2016). Opportunities and challenges for consumer product and retail companies.
[11] Rüßmann, M., Lorenz, M., Gerbert, P., Waldner, M., Justus, J., Engel, P., & Harnisch, M. (2015). Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries. *Business and Information Systems Engineering*, *6*(4), 239–242. https://doi.org/10.1007/s12599-014-0334-4
[12] Sobuj, B., Ray, K., Basak, A., Fatema, K., & Seddiqe, M. M. I. S. (2016). Sector in Bangladesh Study on Supply Chain Management of, *16*(2).
[13] Szozda, N. (2017). LogForum, *13*(4), 401–414.
[14] Tjahjono, B., Esplugues, C., Ares, E., & Pelaez, G. (2017). What does Industry 4.0 mean to Supply Chain? *Procedia Manufacturing*, *13*, 1175–1182. https://doi.org/10.1016/j.promfg.2017.09.191
[15] Vorst, I. J. G. A. J. Van Der. (2004). Supply Chain Management : theory and practices. *The Emerging Science of Chains and Networks: Bridging Theory and Practice*, (January 2004), 1–19. https://doi.org/DOI: 10.1016/j.ejor.2003.08.015