International Journal of Trend in Research and Development, Volume 7(5), ISSN: 2394-9333
www.ijtrd.com

Global Supply Chain Management

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Abstract: Supply chain management is an integral part of most businesses and is essential to company success and customer satisfaction. Supply chains are increasingly becoming global. Global supply chain management (GSCM) is like traditional, supply chain management, except that it involves a company's worldwide interests and suppliers rather than simply a local operation. So GSCM may be regarded as the management of the supply chains physically situated far from one another. It is the synchronization of demand and supply across all the nodes of supply chain. This paper provides a brief introduction on global supply chain management.

Keywords: *Supply Chain Management, Global Supply Chain Management, International Supply Chain Management*

I. INTRODUCTION

A supply chain is a system that is concerned with transforming materials into a finished product or service. It may also be regarded as a network consisting of all parties involved (e.g. suppliers, manufacturers, transporters, distributors, warehouses, wholesalers, retailers, customers, etc.) in producing and delivery products or services to customers. Modern supply chain is complex, dynamic, competitive, and flexible. Standard measurements of the performance of the supply chain include customer satisfaction, service, time, responsiveness, cost, and quality.

Supply chain management is basically the management of such a chain. With the globalization of business, several global companies have formed partnerships with companies halfway around the world. Global or international supply chain is driven by economic globalization as companies wants to expand their supply chains into international territories. Global operations tend to increase business complexity since they involve more players than domestic ones, and global businesses are forced to deal with the influence of political, economic, and cultural factors. Global supply chains are expected to be fully integrated operations along the supply chain so that they can take advantage of the strengths of different locations around the world [1].

The ability to manage complex global supply chains is crucial to the success of a company in the modern economy. Global supply chain management involves managing relationships, transactions, product flows, and information exchange among global supply chain partners through the effective use of technologies. Global electronic commerce, which may be regarded as the buying and selling products, and services via the Internet, stands to benefit from utilizing global supply chain management [2].

II. OVERVIEW OF SUPPLY CHAIN MANAGEMENT

The concept of supply chain first appeared in the early 1980s. The traditional supply chain integrates raw material delivery, the manufacturing process, and product delivery to customers. Waste is present in the supply chain. Recycling of used products has become an integral component of the supply chain. Flexibility is also an important requirement for supply chain, because it facilitates the response to challenges like globalization and technological changes [3] A supply chain can be implemented through the following nine elements [4]:

1. Sourcing
2. Supply chain relationship
3. Product development
4. Order fulfillment
5. Manufacturing
6. Distribution
7. Customer engagement
8. Reverse logistics, and
9. Web-enabled platforms

Supply chain reflects a company's capabilities to carry out effective marketing activities. Supply chain practices are used in manufacturing, automotive industry, and healthcare. Geographic information systems (GIS), building information modeling (BIM), and radio-frequency identification (RFID) are currently finding their way into practice in all types of supply chains. The growing awareness of environmental issues has motivated companies to integrate environmentally friendly practices into their traditional supply chain.

Supply chain management (SCM) is the strategic coordination of business within a particular company and across businesses within the supply chain, for the purpose of creating value for customers and stakeholders. It encompasses all activities associated with the flow of goods from raw materials through to the end user [5]. It assures that goods are produced and distributed at the right quantities, to the right destinations, and at the right time in order to minimize cost. Its main goal is to increase sales of goods and service to the customer. The management of the supply chain includes ordering raw material, storage, finished goods, and logistics. SCM practice draws from the areas of industrial engineering, operations management, logistics, information technology, and marketing.

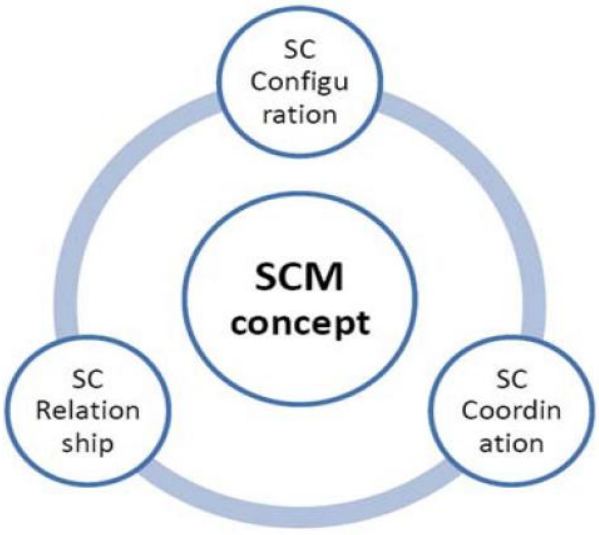

Figure 1: Conceptual model for supply chain management (SCM) [7].

The term "supply chain management" was introduced in the early 1980s to express the need for integrating key business processes. Since 1990s, SCM has become a major modern management model. It has become a new way of managing business and its relationships. Strategies of SCM vary depending on the priorities, objectives, and strategies of the organization. The importance of corporate culture across the supply chain cannot be underestimated [6]. A conceptual model of SCM is illustrated in Figure 1 [7].

For many reasons, supply chain management has changed drastically over the last few years, including information sharing, outsourcing, offshoring, lean manufacturing, globalization, sustainability, the Internet, e-business, and just-in-time Advances in information technology are introducing new possibilities to improve SCM. Recently, RFID (radio frequency identification) has been adopted in SCM to guarantee some security services and to provide ubiquitous computing capabilities. Secure tracking enables tracing the product path during all phases of the supply chain [8].

Nothing has rocked the field of SCM like the Internet. E-business is the marriage [8] between the Internet and SCM. The Internet has had a profound impact on the SCM products. For example, the Internet is used in purchasing and procurement. The huge amount of data coming from Internet transactions causes information overload [9].

Supply chains now generate big data from many data sources such as sensors, RFID, and tracking devices. Supply chain professionals are seeking for ways to handle big data and give valuable insights to their organizations. Big data offers new opportunities, monetary gain, and operational excellence to supply chain practices [10].

III. GLOBAL SUPPLY CHAIN MANAGEMENT

Global supply chain management (GSCM) is basically the same as supply chain management except that it focuses on trans-national operations. It deals with major issues such as the growth of multinational corporations, partnerships, global brand expansion, and outsourcing. The motivating factors for GSCM include lower prices of material, products, and labor; availability of products that are unavailable domestically. GSCM integrates globalization, technology, and global supply chain.

Globalization: GSCM is directly linked with the rise of globalization. Globalization simply refers to the practice of sourcing, manufacturing, transporting, and distributing products outside of the native country of a company. With the advent of the Internet and other technologies, globalization has affected every area of our lives, including politics, economics, education, health, employment, and culture. Companies now look globally for raw materials, services and finished goods to sell into a defined marketplace. Raw materials are procured from one nation and send to another nation where production plant resides. Globalization has also affected supply chain management (SCM). For example, a company with a manufacturing facility in China may want to expand its production in Brazil. Because global supply chain management involves a plethora of nations, globalization has unlocked a plethora of new opportunities for supply chain management.

Technology: This is a key enabler in the transformation from domestic to global supply chains. Digital technologies are increasingly used to enhance global supply chain management. With the Internet at a new height of activity, consumers are constantly seeking new levels of satisfaction. The technologies may include software components, interfaces, communication network, electronic data interchange (EDI), and enterprise resource planning (ERP). Also, big data related technologies, mainly related to sensors, storage, processing, intranets, extranets, networks technologies, cloud computing, Internet of things, and social media, play a crucial role in modern GSCM [11]. The technologies enable information sharing with key partners, which is a key ingredient in supply chain.

Global Supply Chains: A global supply chain is a must for any enterprise that operates around the globe. This may require partnering with foreign companies. Global supply chains are usually longer than domestic ones. Labor is generally less expensive and it is cheaper to manufacture a product overseas than in America. Parent companies must take care to align the interests of all the foreign companies (whether a supplier, an assembler, a distributor, or a retailer) in their supply chain with their own. Global supply chains must incorporate some key characteristics that will set them apart for success: a proactive use of big data, highly optimized inventory management, flexibility and speed with order fulfillment, customization with process implementation, energy sustainability, and compliance. Multinational corporations that desire to have good global reputations must be willing to manage conflicting societal expectations. A typical global supply chain is shown in Figure 2 [12].

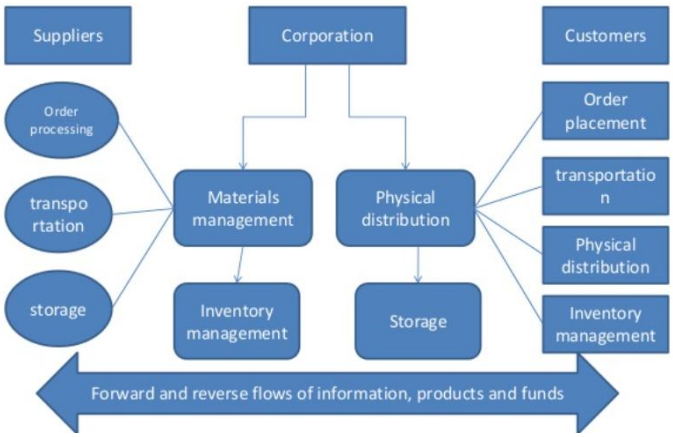

Figure 2: Global supply chain [12].

IV. LEAN SIX SIGMA APPROACH FOR GSCM

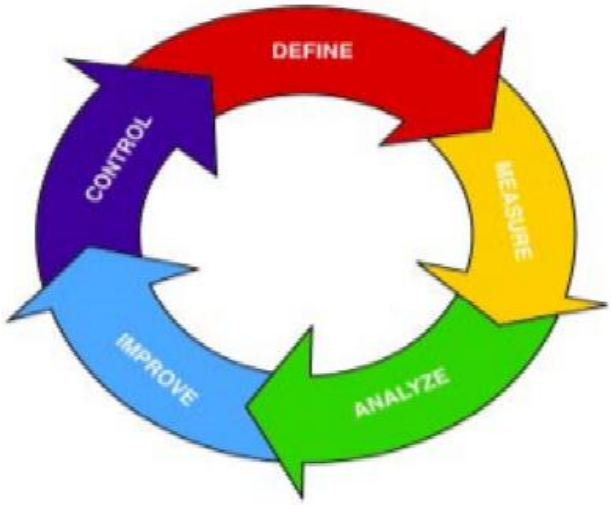

Figure 3: Six Sigma cycle for process improvement [13].

Lean process involves the removal of activities that are not necessary or required for the operations of the business. The

lean concept was initially developed to improve the efficiency of manufacturing operations. It has been further developed to embrace the whole supply chain. Six Sigma uses the standard approach: define, measure, analyze, improve and control (DMAIC) cycle, as shown in Figure 3. The main advantages of having Lean Six Sigma for global supply chain management include [13]:

- Increase in revenue - Lean Six Sigma expands income by empowering your business to produce more with fewer resources.
- Decrease in costs - Any procedure that is not required to produce an item has to be eliminated. Such issues are a liability to the enterprise and have to be addressed so that cost can be reduced.
- Increase in efficiency - Boosting enterprises endeavors by delivering a satisfactory item for clients. Enhanced procedures can help in the growth and development of the firm.
- Active participation by employees – Every staff has to be included in the new procedure. It creates interest and builds trust and forms a mutual understanding of how every employee is critical to the organization.

V. APPLICATIONS

SCM practices have been adopted by organizations all over the world to improve their performance and profits. They are applied in agri-food industry, healthcare/medicine, semiconductor industry, hospitality or tourism, automobile industry, food industry, pharmaceutical industry, and leather industry. Global supply chain management is applied in health commodities for reducing global disease burden.

Today, most enterprises operate globally. Whether it is an automobile firm, an electronic firm or a construction firm, they operate around the world. Leading GSCM include IBM, McDonald's, Intel, Nike, Starbucks, Pepsico, Nokia, 3M, Johnson & Johnson, ExxonMobil, Hewlett-Packard, Coca-Coca, Wal-Mart, BMW, Levono, Samsung Electronics, Amazon, Procter & Gamble, Dell, Amazon, Toyota, and GM.

VI. BENEFITS AND CHALLENGES

Supply chain management must have a multidimensional approach, involving people, processes, and technology. Supply chain professionals design and operate all of the supply chains. They manage transportation, warehousing, inventory management, packaging, and logistics information. Its ultimate goal is to enhance the core competitiveness of enterprises, reduce costs, and improve profitability. In the global competitive environment, individual companies no longer compete as autonomous entities but as supply-chain networks. Maximizing the benefit of the big data for GSCM is a critical issue. Multination companies take advantage of state-of-the-art or lower priced workers in nations such as Taiwan, China, and India.

Other benefits of global supply chain management include [14]:

1. Expanded sourcing opportunities
2. The opportunity to reach new customers in new markets
3. More room to grow
4. More opportunities to save money

Operating and managing a global supply chain is more complex and riskier. Supply chain becomes more complex due to globalization, with parts coming from a diverse set of suppliers. By nature, global supply chains are more risky than domestic supply chains since they are exposed to a variety of risks and vulnerabilities such as demand fluctuations, constantly changing global currencies, price fluctuations, supply disruption, and supply delays. These may have a large impact on the overall profit. The costs of fuel, freight, transportation, and raw materials are increasing and these may also cut into profits. Its successful management requires complying with various international regulations. These regulatory policies, developed by governmental and non-governmental organizations (like United Nations), compel companies to obey the regulations set in place which often impact their profit. Since customers are constantly changing what they value, it is difficult for managers to predict changing values in a global supply chain. Other challenges of global supply chain management include [14]:

1. Large-scale management issues
2. Heavy investment in time, money, and resources
3. Greater risk
4. Market instability
5. Global competition
6. Information collection challenges
7. Currency fluctuations
8. Compliance with international regulations and standards
9. Legal issues
10. Maintaining intellectual property protection

CONCLUSION

Today, every enterprise sources globally, sells globally, or competes in international markets with some companies that do. Globalization and integration of the world economy enable organizations of all sizes to access new markets, new sources of supply, talents, capital, and technology. Since globalization is here to stay, supply chain managers must take advantage of the opportunities that globalization offers. Global supply chains are now the wise approach for large corporations as they allow them to take advantage of international products and capital markets and maintain a competitive advantage in a dynamic market environment.

Advances in e-commerce have greatly increased the demand for global supply chain management skilled GSCM professionals. To meet the increasing demand, some academic institutions have started offering graduate programs in global supply chain management. The global scope of supply chain management offers students a career path in either industry or consulting firm. The basic skills expected for GSCM managers include social skills, decision-making skills, problem-solving skills, time management skills, and integrity. More information on global supply chain management is available in the books in [7,15-32] and also in the related journal: *Journal of Supply Chain Management*.

References

[1] A. Foroughi, M. C. Kocakulah, and W. C. Perkins, "Performance metrics: Key to success in global supply chain management," *Journal of Transnational Management Development*, vol. 8, no. 3, 2003, pp. 35-45.

[2] S. C. J. Palvia, "Global e-commerce and global supply chain management," *Journal of Global Information Technology Management*, vol. 3, no. 3, 2000, 1-6.

[3] M. N. O. Sadiku, K. G. Eze, and S. M. Musa, "Supply chain management," *International Journal of*

Engineering Research, vol. 7, no. 8, August 2018, pp. 137-139.

[4] C. Kuei , C. N. Madu, and C. Lin, "Developing global supply chain quality management systems," *International Journal of Production Research*, vol. 49, no. 15, 2011, pp. 4457-4481.

[5] "Supply chain management," *Wikipedia*, the free encyclopedia https://en.wikipedia.org/wiki/Supply_chain_management

[6] D. M. Lambert and M. C. Cooper, "Issues in supply chain management," *Industrial Marketing Management*, vol. 29, 2000, pp. 65-83.

[7] D. Lu, *Fundamentals of Supply Chain Management*. Ventus Publishing, 2011, p. 14.

[8] M. Chamekh, H. Hamdi, and S. E. Asmi, "A new architecture for supply-chain management*," Proceedings of the 14th IEEE Annual Consumer Communicatons & Networking Conference*, 2017, pp. 77-82.

[9] M. E. Johnson and S. Whang, "E-business and supply chain management: An overview and framework," *Production and Operations Management*, vol. 11, no. 4, Winter 2002, pp. 413-423.

[10] S. Raman et al., "Impact of big data on supply chain management," *International Journal of Logistics Research and Applications*, 2018.

[11] T. M. Choi, "A system of systems approach for global supply chain management in the big data era," *IEEE Engineering Management Review*, vol. 46, no. 1, First Quarter, March 2019, pp. 91-97.

[12] "Global supply chain management," https://www.slideshare.net/rajshravanthi/global-supply-chain-management-64201204

[13] A. Jayaram, " Lean six sigma approach for global supply chain management using Industry 4.0 and IIoT," *Proceedings of the 2nd International Conference on Contemporary Computing and Informatics*, 2016..

[14] S. Aswell, "4 Benefits & 6 challenges with a globalized supply chain," September 2016, https://blog.contractroom.com/4-benefits-6-challenges-with-supply-chain

[15] J. Manners-Bell, *Supply Chain Risk Management: Understanding Emerging Threats to Global Suppy Chains*. Kogan Page, 2nd edition, 2018.

[16] M. Kotabe and M. J. Mol (eds.), *Global Supply Chain Management*. Edward Elgar Publishing, 2006.

[17] J. T. Mentzer et al. (eds.), *Handbook of Global Supply Chain Management*. Sage Publications, 2007.

[18] D. Long, *International Logistics; Global Supply Chain Management.* Kluwer Academic Pubs., 2003.

[19] S. Joshi and R. Joshi (eds.), *Designing and Implementing Global Supply Chain Management.* Hershey, PA: Business Science Reference, 2016.

[20] B. Christiansen (ed.), *Handbook of Research on Global Supply Chain Management.* Hershey, PA: Business Science Reference, 2016.

[21] Y. Lau, A. K. Y. Ng, and J. A. Alarid, *Principles of Global Supply Chain Management.* Anthem Press, 2019.

[22] U. Akkucuk ,*Ethics and Sustainability in Global Supply Chain Management*. Hershey, PA: Business Science Reference, 2017.

[23] P. Kouvelis et al. (eds.), *Handbook of Integrated Risk Management in Global Supply Chains.* John Wiley & Sons, 2012.

[24] B. B. Flynn and X. Zhao (eds.), *Global Supply Chain Quality Management: Product Recalls and Their Impact.* Boca Raton, FL: CRC Press, 2015.

[25] Y. Monden and Y. Minagawa (eds.), *Lean Management of Global Supply Chain*. World Scientific, 2016.

[26] J. K. Pinto and Ray R. Venkataraman, *Operations Management: Managing Global Supply Chains.* Sage, 2018.

[27] D. Waters and S. Rinsler, *Global Logistics: New Directions in Supply Chain Management.* 7th Edition Kogan Page, 7th edition, 2014.

[28] C. W. Autry, T. J. Goldsby, and J. E. Bell, *Global Macrotrends and Their Impact on Supply Chain Management; Strategies for Gaining Competitive Advantage.* FT Press, 2013.

[29] J. Mangan and C. Lalwani, *Global Logistics and Supply Chain Management.* Chichester, UK: John Wiley & Sons, 3rd edition, 2016.

[30] D. Ivanov, A. Tsipoulanidis, and J. Schönberger, *Global Supply Chain and Operations Management: A Decision-Oriented Introduction to the Creation of Value.* Springer, 2019.

[31] P. Kouvelis and P. Su, *The Structure of Global Supply Chains*. Hanover, MA: Now Publishers, 2007.

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