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Critical and Analytical Evaluation of the Relationship between Supply Chain Characteristics and Manufacturing Strategies: Case of Unilever

Samir Ali Syed*

Independent Researcher

Corresponding Author: Samir Ali Syed, Independent Researcher, E-mail: samir2142@gmail.com

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Abstract

The research is based on carrying out a critical analysis for evaluating the relationship between Supply Chain (SC) characteristics and manufacturing strategies at Unilever. For this, the SC characteristics are identified as integrations, flexibility, visibility and geographical dispersion causing a considerable impact on the manufacturing strategies of a company. In order to analyze the relationship of these SC characteristics on Unilever manufacturing strategies overview of its non-financial indicators, its manufacturing approach and approach towards deployment of innovation techniques is carried out. For this the company's annual reports and relevant data was selected, since the research conduction was impacted by COVID-19 epidemic, therefore only descriptive analysis by selecting secondary data was carried out. Findings of the research indicate the Unilever possess a strong stance of SC integration and geographical dispersion. As it has wide spread business, followed by vertical integration, it acquires more 60 mergers, acquisitions and partnership programs spanned for the duration of, 2010-19. Along with this, the findings indicated that attainment of innovation is a fundamental approach of SC integration and geographical dispersion at Unilever. Moreover, the company's SC characteristics such as visibility and flexibility are also evidenced by its diverse products' culture and approach for establishing stronger relations with its suppliers.

Keyword: Supply chain characteristics, Manufacturing strategy alignment, Supply chain integration, Global supply chain strategy, Strategic operations management, Innovation-driven manufacturing, Sustainable supply chain management, Qualitative case study, Multinational enterprises, Unilever, Sustainability, Vertical integration, FMCG

Introduction

Supply chain is defined as the network of the organizations that are involved in various activities and procedures, creating value through products and services to make them available to the end-users of the company. There are two basic types of managerial issues are usually faced by the organizations regarding the management of the supply chains; one is the configuration and other is coordination. Based on this, it is necessary to understand the basic characteristics of the supply chains of the companies in order to link these strategies to the manufacturing strategies of the firms in order to have more benefits and making it a competitive advantage for the firms. Manufacturing systems and strategies cannot be seen in the isolation rather must be in the context of the whole organization as well as links between the collaborative organizations developing closer relationships in a manufacturing system or network [1]. But to the researcher's knowledge to the date, there are no studies that have discussed this relationship in detail. Here are various studies found in the literature that deal with the various sorts of collaborations such as virtual company, extended enterprise and supply chain, as well as their key attributes, are studies but there are very limited research studies that elucidate the way companies should design and operate the manufacturing systems by aligning the supply chain characteristics and manufacturing strategies [2,3]. Therefore, it is essential and appropriate for the researcher to conduct this study in order to explore the relationship between the characteristics of the supply chain and manufacturing strategies of the companies. In order to improve the competitive capabilities companies to have an understanding of the way the companies should design the supply chain and manufacturing operations to fulfill the needs and requirements of the markets. Unilever Company which is a UK based international manufacturing and selling company [4]. This research is aimed to investigate the main characteristics of the supply chain, issues of the supply chain, manufacturing strategies, need of alignment of manufacturing strategies and supply chain characteristics along with their impact on the sustainable growth of Unilever.

Background of the study

The supply chain consists of an incorporated business plan for the management of logistics where logistics and manufacturing department inherits a hand-in-hand approach. It assists in the flow of goods starting from the suppliers for raw materials and then finally, the finished goods are channeled to the final consumer from manufacturing and other distribution channels. Christopher and Lee, had suggested that it is the supply chain management of a company that helps them to compete with others [5]. Currently, information systems have become an essential resource by assisting many business entities and their processes The new economy basically focuses on aspects such as developing core strengths, providing real-time information, integration of all the markets around the world, clarity of all the key performance indicators, cooperation and

partnerships in various supply-chain operations, along with the emergence and development of e-commerce [6].

Unilever has adopted numerous successful strategies for achieving its goals and objectives – there are efficient supply chain strategies such as lean management that have progressed with time [7]. Lean production was mainly used for describing procedures relating to the reduction of wastefulness related with the manufacturing strategies of a vehicle industry. Jones had suggested that analytical lean follows a real setting by developing value for customers by observing the situation as one. Leanness consists of developing a value stream for the purpose of eliminating all waste consisting of both times along with ensuring a smooth flow relating to production [9]. Lean takes place at two levels formerly known as a strategic level and operational level. We can apply the strategic customer value creation everywhere, but the creation of value can be only applied for attaining better quality, cost along with timely delivery [8]. Therefore, it is essential for developing a supply chain strategy that has the ability to optimize the manufacturing strategies and matching the market characteristics with the supply.

Unilever operates in a volatile market because of many factors which have implemented an agile strategy [7]. Agility has developed new patterns under the current market situation. Naylor, had defined the word agility as utilizing the available market information along with an effective collaboration for exploiting many profitable opportunities [9]. Christopher and Towil, had revealed that agility consists of a potential that helps in accepting the shape of the organization, numerous information systems and logistic processes within the marketplace [10]. The supply chain planning is basically an interactive process that determines and evaluates the cost-benefit of the trade-offs of various operational components whereby relating with manufacturing strategies [11].

Supply chain management consists of an operational and descriptive segment due to which the orders of the market at one end for a particular product or service can be expanded. The management approach acquires a composite relationship with the manufacturing strategies of a company, as an integrated structure that helps in minimizing ineffective activities and their related structures, including aspects for effective cost influencer that influences investment expenses, operating expenses, along with halting the process of the supply chain [6].

Significance of study

A successful business strategy supports the organization's core competencies for achieving its goals and objectives. It consists of analytic and decision-making process – helping business entities by answering important questions such as what to offer customers and when to offer by having a competitive plan in mind. Business strategies help in directing the company to accomplish its targets [7]. The supply chain strategy comprises of the actual operation along with its extended supply chain for the purpose of meeting specific supply chain objectives [9]. The supply chain strategy focuses on cutting down its operational costs and helps in maximizing efficiency [1]. For example, a business entity can choose a strategy for directing the suppliers to remain competitive in the market. Supply chain strategies help in defining how the operation of the supply chain should be carried out in order to compete, whereby the manufacturing phase is the critical phase of a business's operational functions as it relates with the budget management, quality management and time management perspectives of a business's management strategies [7].

Supply Chain Management's goal is to integrate and combine all the processes for the purpose of reducing waste such as products that have been declared as defective, inventories, along with any capacity that is idle due to certain failures, where the manufacturing strategies carries critical assessment during this integration [1]. It is important to minimize the cycling period for order-to-delivery along with designing workable feedback for the entire supply chain. Efforts can help in minimizing the waste within the supply-chain processes, where the waste production is linked with the manufacturing process of a company – hence signifying the relationship of manufacturing and supply chain strategies at an organization. The strategic approach includes with the help of three essential means such as by decreasing duplication, gaining consistency among operations and its systems and last but not the least enhancing quality [8,12]. Since the relationship between the manufacturing strategies and supply chain management holds a significant importance, therefore a need for exploring the critical aspects of this relationship is found. Yet there is lack of research and investigations emphasizing the subject with critical analysis, therefore this study is framed to fulfill this need by critically analyzing and evaluating the manufacturing strategies and supply chain strategies of organizations – whereby Unilever being a diverse organization provides a rich framework to explore the subject of this study.

Research question

- What is the relationship between supply chain characteristics and manufacturing strategies of Unilever?

Research aims and objectives

The main aim of this study is to critically and analytically evaluate the relationship between supply chain characteristics and manufacturing strategies of Unilever.

Following are the objectives of the current study based on the aim of the research:

- To identify and critically analyses the characteristics of the supply chain of Unilever.
- To identify and critically analyses the manufacturing strategies of Unilever.
- To identify and critically analyses the relationship between the characteristics of the supply chain and manufacturing strategies of Unilever.
- Based on the findings of the research, to give recommendations to improve the relationship between characteristics of the supply chain and manufacturing strategies of Unilever.

Literature Review

The network of the companies that deliver as well as manufacture goods and services from the source to the consumers is known as supply chain [13]. The process of integration of financial flows, information and materials in these networks is termed as supply chain. Integration is incomplete with the strong association of the linkages of the associations amid the components of the supply chains.

Characteristics of supply chain

Following four are the main characteristics of the supply chain that are necessary to be aligned with the manufacturing processes of the organization, including visibility, integration, flexibility and

geographical dispersion. Geographical proximity or dispersion is an important characteristic of the supply chain that impacts the manufacturing strategies along with other operations of the companies [13,14]. In the supply chain, different entities are connected through the physical flow of the materials in various geographic regions. Geographical dispersion is about the degree to which customers, distributors, production facilities and suppliers of the supply chain of the company are located across the wider range of the geographic regions. Therefore, this geographical dispersion will lead to different supply chain issues. Geographic dispersion will require the varied strategies of manufacturing. It is essential for the companies to develop the manufacturing strategies of the company in line with the geographical needs to have an effective supply chain. The greater the dispersion higher will be the chances of disruptions in the supply chain and consequently, more will be the impact on the operations of the companies, including manufacturing processes and strategies.

Another characteristic of the supply chain is the agility of the supply chains due to the global markets which requires the companies to align the customers and suppliers of the company to work together and streamline the functions in order to have the greater levels of agility [2]. The ability of the companies internally, as well as the connection of the company with its partners in order to respond to rapid market changes, is known as the agility of the supply chain. Supply chain agility is an important factor that should be aligned to the manufacturing strategies of the company; otherwise, the company will face the issues. The agility in the supply chain requires the agility in the manufacturing process as well. Manufacturing flexibility is a significant factor of the agility in the supply chain.

Supply chain flexibility is about the speed a supply chain is able to respond to the fluctuations in the business environment and demands to produce or retain the competitive advantage. The supply chains must be flexible, particularly in the case of international firms because such firms have greater fluctuations in the demands. In order to meet the high marketing demands companies require logistics capabilities, warehouse, inventories and manufacturing capacities. Supply chain flexibility also impacts the manufacturing strategies adopted by the companies.

Electronic-supply (e-supply chain) is about the incorporation of the e-business approaches into the supply chain processes. It is one of the main strategies of supply chain performance. E-supply chains influence manufacturing strategies positively. These assist the supply chain management by resolving the issues of the supply chain by fulfilling the demands of the customers with the supplies through efficient consumer response. E-supply chain will improve the process and better performance of the supply chain will require efficient manufacturing strategies to cope with the changing demands [3].

Supply chain visibility is the degree to which he players of the supply chain can access the relevant information necessary for the operations of the company as well as have the mutual benefits for them. The visibility of the supply chains is of the varying nature in terms of information sharing among the affiliates of the supply chain. Supply chain visibility is the core component of supply chain performance. Companies can achieve a high degree of visibility through sharing extensive information which is meaningful as well as useful for the partners of the supply chain. The visibility levels of the supply chain also change the manufacturing strategies of the companies.

Aligning supply chain strategies and manufacturing strategies

Taps and Steger-Jensen, conducted a research study in order to determine the importance of the supply chain alignment with the manufacturing strategies of the companies [2]. The results of the 34 multinational companies indicated that supply chain strategies must be aligned with the manufacturing strategies as it would be cost-effective for the companies. They also found that manufacturing designs must be in line with the supply chain in developing countries.

Roh, Hong and Min, in their research, found that responsive supply chains play a significant role in the manufacturing strategies of the organization [15]. They also found the way ways to achieve the responsive supply chains along with their drivers that are significant to align them with the manufacturing processes of the companies. Supply chain characteristics greatly influence operations of the multinational organization because such companies operate in the globally and have the challenges that are wide-ranging. To cope with these challenges and remain competitive organization need to make the manufacturing strategies consistent with the supply chain.

Shao, found in their research conducted in the context of China that supply chain characteristics such as supply chain dispersion, agility, integration, visibility and responsiveness are core component of the supply chain performance and this performance in terms influences the manufacturing strategies of the organization [16]. They further added if companies are able to align the characteristics of the supply chain with the manufacturing strategies of the companies, then companies' performance will increase.

Kim and Chai, found in their research that agility and the flexibility of the supply chain greatly impact the supply chain performance and the operations of the organization. They further added that these supply chain characteristics also have a strong influence on the manufacturing process of the companies. If these are effective, then the manufacturing process will also be efficient and *vice versa*. Choi, in their research conducted to analyze the supply chain performance found that supply chain integration has a strong influence on the manufacturing strategies because effective integration will reduce the costs and will improve the products and services of the organization.

Integrated supply chain and manufacturing strategies

Supply chain integration is a process of bringing as many links as possible in order to improve the working relationships with the aim of reducing costs, improving production time and response time [16]. This integration of the supply chain plays a vital role in the performance of the supply chain. Supply chain integration is also a vital component of the success of companies. Improved inbound logistics will ultimately improve the processes of manufacturing. Supply chain integration also impacts the manufacturing strategies of the organization. Kim and Chai, suggested that supply chain integration improves the manufacturing processes of the organization by increasing the response rate and decreasing the costs. A supply chain design that is integrated is usually developed for apprehending arising difficulties related to product that is multi-product, the management of inventory based on multi-echelon, production planning based on many production periods, the capacity utilized along with the technology used and the sources involved – there are options related to the pricing of options that tends to focus on examining the flexibility of the operational activities for the purpose

of increasing the value for shareholders [17]. A model was designed for examining the real compound option. This survey is complete and inclusive of all important aspects that could be seen from a perspective of business management. Ganeshan et. al., had investigated supply chain management's basic theory with the help of a conceptual view and perspective [18]. It was studied thoroughly from its roots and definition to get a better and broader understanding. It was also declared that supply chain management seems to be evolving and changing over the years including the management of materials, combined logistics along with the distribution of products. Bhatnagar et. al., had studied the co-ordination and collaboration of production planning in numerous plants in a particular organization based on vertical integration [19]. It has been found out that both decisions relating to production along with inventory could be easily determined that could optimize the organizations production and planning as a whole – there are several problem areas that could arise such as nervousness, problems related to lot-sizing and safety stock. Kouvelis and Gutierrez, had introduced maximum centralized along with decentralized policies for the purpose of controlling a stochastic management inventory system [20]. Initially control polices relating to optimal centralization are developed and then later policies relating to the sub optimal decentralization are developed. A control structure has been proposed relating to the decentralized production with a non-linear scheme for pricing that can be administered by using an intermediate organizational unit. There are several approaches that have been proposed for achieving supply chain management. It has been estimated that the greater is the integration the greater would be the level of improvement. It can be applied in the case of following unique identities in the material flow of the supply chain management [21].

Scope and direction of integration

There is another approach that focuses on the scope as well as direction of integration. Droge et al., had found this during a time-based conduct while designing a new product [22]. It has also been found out that internal integration strongly bolsters external integration as a result of which an organization's performance is affected [23]. At higher organizational levels the integration of the supply chain mechanism depends on the team for collaborating with other external associations. Van Beers and Zand, had argued that geographical differences can help in improving their existing products, while differences among teams can help in the production of new products [24]. Brattström and Richtnér, had investigated that integration within the research and development department along with the procurement department has a direct influence on their external associations or suppliers [25]. It has been suggested that coordinating with various teams may result in a diversified role along with impacting differently at all levels [26].

Supply chain innovation in the manufacturing industry

The flow of information in the management of supply chain usually moves in the upward direction, while on the other hand the flow of material usually has a downward trend. There is a flow of information that moves from the customers to the retailers, suppliers and other manufacturing units. Since years, the system of production has been working this way. It is essential for informing all partners in a supply chain simultaneously. The equal dissemination of information consisting of customer's information is one of the main features of a successful supply chain management. Generally, the material has a downward trend because materials flow from the suppliers to the customer's and it is collaborated with others in the entire supply chain network. Therefore, it is important that all the information pertaining to both upstream information and downstream information should be equally distributed to all the partners within the supply chain for effective management of the supply chain. Batch production is a popular method that is used by various manufacturing industries. Highly integrated models and systems becomes the base for a strong technical starting point. ERP known as enterprise resource planning is being widely used in the management of the supply chain by various organizations. It is seen as a revolution for integrating various functions of the organization [27]. This strategy also assisted companies in working on their weaknesses by re-engineering their production process. The supply chain is a process that integrates each and every level within the organization together such as the manufacturing and finance department and has helped to transform organization from a supplier-driven model to a supplied-driven model of production. It helps manufacturing and production organizations to develop products according to the demands of their customer's. It also helps to transform traditional models and methods in to new and modernized methods of production. Customer satisfaction is important for every organization; hence organizations usually seek customer satisfaction by the sharing of valid and authentic information [17].

Supply chain and manufacturing strategies: Integrated models

There are various studies and literature on the integration of supply chain activities. Majority of studies are survey based by using perpetual assessing methods [28-30]. This model of approach has helped organizations in many ways by integrating both customers and suppliers. It has been observed that there are some exceptions [31]. Some researchers have named integration as a concept of monolithic that enables different variations within different organizations to immerse. Flynn et al., had provided a summary in detail for a written literature that looked into various dimensions for the purpose of integration along with the impact of integration on different levels of performance [23]. There is important information is revealed pertaining to the direction, along with its scope and focus.

Organizations strive to improve and enhance their productivity by reducing their operational costs along with minimizing the production time and delivery time for setting an effective supply chain. Hence it is essential for organizations to work upon an effective methodology for the purpose of designing and examining their supply chain models [17]. Newhart, had proposed a model which was double phased for the purpose of providing a tremendous supply chain strategy [32]. Initially a mathematical method and approach was used to examine the number of products that were distinct at various points in the supply chain. Spreadsheet method for recording inventory was used to evaluate the amount of safety stock required for minimizing the number of fluctuations occurring within the supply chain. Ishii et. al., had developed a model for determining different economic levels for determining both base stocks along with lead times for an integrated production and transportation model and systems of inventory [33]. Pyke and Cohen, had developed a multi-product approach model consisting of a stochastic approach [34]. This approach also requires a well-defined algorithm. Evans et al., had stated that there was a methodology for the purpose of stimulating a behavior for controlling the logistic elements in a supply chain [35]. A stronger model was used along with PID (Propotional-Integral-Derivative). Towill, had used techniques comprising of stimulation for the purpose of examining various supply chain strategies and models [36]. This method had an objective that was to analyze those strategies that were

effective in leveling different pattern in the demand. Slats et. al., had noted that techniques and models pertaining to the research of operations can help in examining the performance of both logistics along with its process [17,37].

Additionally, the research has indicated that there is a notable direct association among supply chain management, SCMPs and MFP – these are the findings that were examined thoroughly and were verified by using SEM analysis in which the co-efficient were found as being positive. Hence showing a positive relation between them – MFP was also examined entirely as a moderate variable. The effect of mediation was not as much as strong as being directly affected by SCMP on the production of supply chain management [37].

Supply chain and additive manufacturing

It basically provides a comprehensive innovation relating to the technology used in manufacturing [38,39]. This approach has been seen as enablers for providing better advantages relating to the product so much so that it helps in the reduction of waste and enables a better batch size [40]. This can be seen as a life changing innovation by providing a groundbreaking change for manufacturing sector and industry [41,42]. This approach cannot be achieved alone but rather it requires several stakeholders to get involved in the entire process [43]. It consists of a supply chain that involves many organizations who transfer both information and processes for the purpose of creating value [44]. It will affect all types of organizations that are involved such as new organizations as well as older organizations because new organization will have new skills and capabilities (e.g. AM material suppliers, service providers and designers). It has been suggested to view this approach as a systematic change for achieving benefits at a large scale [45].

It has been studied that organizations following the same strategies and structures tend to become similar in nature hence enabling them to face same conditions pertaining to the environment. Coercive isomorphism is a mechanism that helps in explaining and determining the similarities and implies that organizations that are strong use innovation techniques [46]. Braunscheidel et al., had indicated that it is a process that consists of following a lean approach by the adoption of the concept of Six sigma [47]. It is usually the customer that impels for using the lean approach. Customer's get motivated by the idea of lean production and pressurize suppliers to follow and incorporate the same pattern.

Research Methodology

Research methodology is defined as a well-structured process deployed as an instrument for carrying out a research process for presenting resourceful outcomes – along with this it includes a systematic layout consisting of different steps such as recording data based on facts and figures, analyzing it with accordant approaches, evaluating for proposing resourceful findings and presenting the obtained findings with relatable interpretations. In general, there are two main methodologies for conducting research such as qualitative research and quantitative research. For instance, qualitative research is based on the descriptive analysis of the collected data and quantitative research is based on the statistical analysis of the obtained data [48]. Since our research is aimed to present a theoretical interpretation of the relationship between manufacturing strategies and supply chain characteristics of Unilever therefore includes the deployment of qualitative research. For this the research strategy based on selecting of case studies and formulating the findings of the research by using systematic pattern of observations was adopted.

Research philosophy

Research philosophy describes the intention and objective of research methodology as it deals with the source, criteria and systematic development of knowledge in conducted research. For this research philosophy is categorized in accordance with the diversity of knowledge aimed to be developed in research, presetting it types such as ontology, epistemology and axiology. Furthermore, these are divided in subdivision, where epistemology includes positivism, realism and interpretivism. Where, interpretivism research philosophy is in particularly related with the researches of qualitative and investigative approach. Since our research is based on the investigations of the manufacturing and supply chain strategies of Unlived aimed to present a qualitative analysis interpreting the relation between them therefore interpretivism philosophy is selected for this research.

Research approach

There are two research approaches that can be used which are deductive and inductive approach. In the case of an empirical approach, theory and hypotheses are expressed and on the basis of which a research strategy is designed in order to test the proposed relationship. While in the case of the deductive approach, data are gathered and based upon the analysis of that data, the theory is formulated. As the purpose of the current study is to explore the relationship of the supply chain strategies and manufacturing strategies based on the information in the company reports, company websites and other related published press to propose the relationship and develop theory based on the observed data, so inductive approach will be suitable to carry out this study. Moreover, this is a context-based study that is an analysis of the supply chain characteristics and manufacturing strategies of the Unilever, which also make it appropriate to use the deductive approach.

Research design

Research design is referred as a structured layout describing the plan of research [49]. This includes the logical infrastructure of research related with the collection of data, carrying out its accordant analysis and presenting contributive results from it. Also, there are six main strategies which are given by Saunders et al., including archival research, ethnography, ground theory, action research, case study and survey. Since this study is aimed to provide descriptive analysis based on observations from case studies – for extrapolating the relationship between the supply chain strategies and the manufacturing strategies of the Unilever Company – that can be obtained from annual reports, published papers in the targeted study area, therefore the appropriate research philosophy for this approach is empirical research.

Data collection techniques

Various methods can be used in order to collect data for the research. There are two basic methods that are used to collect data which are primary and secondary data collection method. Where, primary research method refers to the collection of data from the sources such as observations, surveys, interviews and secondary method of data collection refers to data obtained from sources such as literature, published papers, annual reports. Since this study is based on empirical research requires the investigation of case studies

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therefore it includes the secondary method for data collection. For this data is collected from annual reports of Unilever Company and relevant journal articles elaborating the interest of subject. This involves the analysis of particular number of case studies to find and choose the accordant annual reports, published papers and journal articles to be gathered for conducting research. Therefore, the research design of this study is based on exploring the annual reports, published papers and journal articles for Unilever Company on a course of, 2010-19.

Analytical techniques

There are a series of analytical techniques deployed for empirical research such as hermeneutics or interpretive analysis discourse analysis, grounded theory analysis, content analysis and cross-cultural analysis, ethnographic analysis, phenomenological analysis etc. Since according to the context of this study interpretive analysis is proposed to provide resourceful and constructive outcomes from this research.

Time horizon

It is also important to give the time frame of the research. There are two types of data collection, i.e. cross-sectional, which is about the collection of data at one point in time and other is longitudinal research. This study will be longitudinal as data will be used from the various years about the strategies of the Unilever.

Data analysis procedure

Having said that earlier that data for this research is secondary, the data will be gathered the annual reports and published press about the supply chain and manufacturing strategies of the Unilever. The data analysis techniques will be qualitative. The content analysis will be performed to analyze the gathered data with the help deductive approach based on carrying an insightful analysis.

Validity and reliability

In order to ensure the reliability and validity of a qualitative research based on secondary method of data collection the selection of valid and authentic sources for collecting case studies is carried out [50]. For this, the data is collected from world-renowned firms in terms of consultancy service providers, such as annual reports of company itself. Approaching well-reputed web sources for using their data as a reference. Selection of particular publications that are subjected to strict regulations and any misconduct leads to severe consequences in the form of penalties and revocation of the license. As a result, this research is validated and reliable to perform efficiently and effectively. Moreover, the data from the annual report of the company validates the assurance of intact data reliability.

Ethical considerations

For qualitative research the philosophical ideologies such as consequentialism and deontology are considered – for this the principles of autonomy, beneficence and justice are deployed presenting the approval, verification and certification by the Research Ethics Committee (REC) and Institutional Review Boards (IRBs) [51,52]. This approach provides assurance for information consent, reducing the risk propensity related to data validity and intended use of the potential data. Therefore, this research is carried out by ensuring the use of data resources that fulfill the stated requirements.

Data Analysis

Supply chain and its characteristics at Unilever

At Unilever supply chain is considered as a catalytic source to organizational success. According to official declaration the characteristics of Unilever supply chain are defined by the team management responsible to manage the inventory and returns, sourcing raw materials, processing, controlling and monitoring the manufacturing of products and distribution of products in the target market [4]. For instance, the overall infrastructure of Unilever supply chain comprises of approximate 100,000 employees, interconnected 70,000+ suppliers and 1.5+ million farmers dedicated to manage the logistics network that includes about 1.5 billion kilometers of transport distance [53]. According to the annual reports of Unilever, it defines the characteristics of its SC characteristics as leadership, technology approach and logistic network [54]. Leadership plays a crucial role for determining the success of supply chain at this company. For instancing the basic infrastructure of SC depends on the two core components such as purchasing materials and converting them into resourceful products that requires strategic manufacturing process, along with accordant distribution to potential customers.

Supply chain visibility and flexibility

Unilever supply chain network reflects its flexibility and visibility. The SC network at Unilever incorporates manufacturing process as its core elements, where the other components of Unilever SC network are also significantly related with the manufacturing process at Unilever. Therefore, a considerably strong relationship exists between the supply chain characteristics and manufacturing strategies at Unilever Company (Figure 1). Following diagram represents the SC structure of Unilever Company:

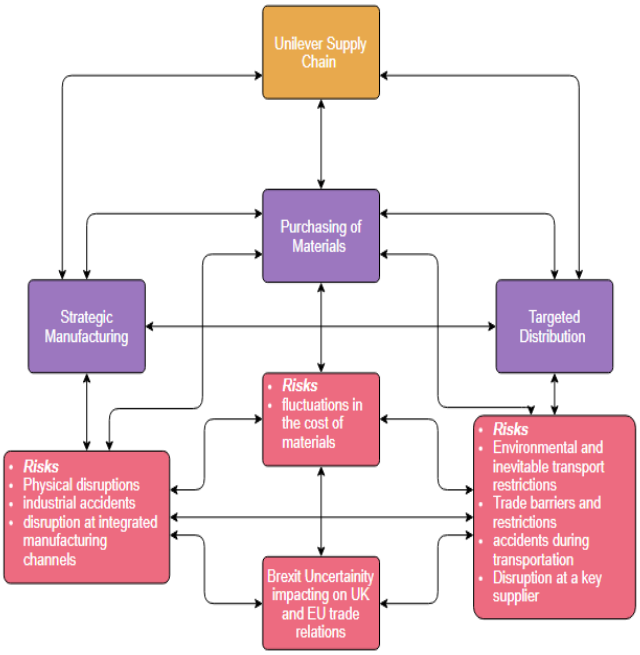

Figure 1: Supply chain network of Unilever.

It is observed that an important concern co-relating the manufacturing strategies and SC characteristics at Unilever are risks

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identified in the above chart. In order to overcome these risks Unilever launched its Unilever Sustainable Living Plan (USLP) in 2010, that was affirmed to enhance the optimality of its SC in relation with manufacturing strategies such as control to CO_2 and Sulphur oxides emissions, reducing the risk propensity of accidents and optimizing the production of waste and energy during the manufacturing process [55]. The main paradigm for applying this plan was based on the huge expenditure (€1 billion of investment) of Unilever dedicated for its R & D department that foster innovation and allows this Company to find technology-oriented, cost-effective and growth building solutions (Figure 2) [56]. Following this, the first-year metrics of improvement were observed:

Figure 2: Unilever USLP achievement 2011.

Supply chain integration and geographical dispersion

As observed supply chain integration is a critical component defining the relationship between supply chain characteristics and manufacturing strategies of a firm. For instance, supply chain integration is of two main kinds such as horizontal integration and vertical integration. For Unilever supply chain integration strategy, it follows vertical integration that incorporates a considerable number of third-party manufacturers. As indicated by the Annual report of Unilever, there are 300+ self-operated manufacturing factories, whereas 700+ third-party integration for manufacturing products [57]. Yet, while considering the SC characteristics for geographical dispersion and integration, the company follows open innovation for achieving its objectives. For this the company purchases innovative start-ups, well-recognized brands and integrate them in its business model, expanding its scope of geographical dispersion and hence providing an innovative framework to improve its manufacturing strategies. Such as since, 2010 Unilever has made 60+ acquisitions. This includes the merger with an e-commerce company offering shaving products i.e. Dollar Shave Club in, 2016, with the price of $1 billion and the purchase of a household cleaning brand, the Seventh Generation in approximately $700 million [56]. Moreover, recently Unilever has acquired merger with Hindustan Unilever limited and providing ice-cream selling services in Chile to Carozzi, also, the 82% completion of acquisition with GlaxoSmithKline Bangladesh Limited in, 2019 – along with this the merger of Unilever with Living Proof in, 2017, a company to provide solutions of hair problems with breakthrough sciences and its partnership with Ampere Life Sciences based in Silicon-Valley announced in, 2010, are two prominent embodiments of innovation acquirement *via* SC geographical dispersion and SC integration (Figure 3) [58].

The following chart shows the extensibility of geographical dispersion and SC integration for Unilever Company:

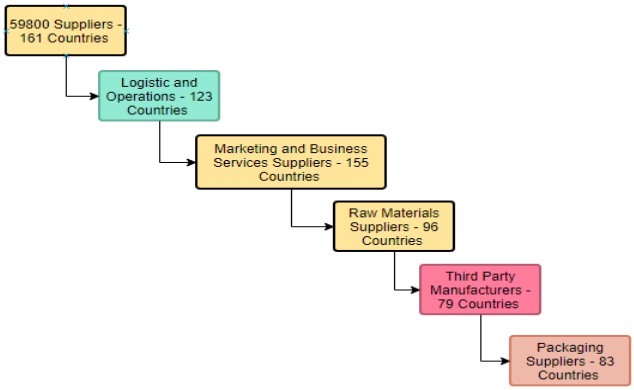

Figure 3: Unilever supply chain geographical dispersion.

Therefore, the SC characteristics such as integration and geographical dispersion show a significantly important relationship of SC characteristics and manufacturing strategies. For instance, the due diligence of Unilever manufacturing and SC network is identified with risks due to its vertical integration and highly scalable geographical dispersion [57].

Unilever sustainable living program (USLP)

The Unilever Sustainable Living Program (USLP) identifies the relationship between Unilever supply chain characteristics and its manufacturing strategies. The Chief Executive Paul Polman initiated this plan in, 2010, declaring the aim to expand the business with doubling its size along with maintaining an environment friendly manufacturing strategy, for this the company deploys innovative strategies such as drip irrigation [59] (Figure 4). The following objectives were aimed for the USLP program:

Figure 4: Unilever sustainable living plan.

An important concern of USLP initiative is the water problem that relates its supply chain characteristics with manufacturing strategies. USLP includes the aim to obtain ½ parts reduction of water consumption for Unilever products by, 2020 [60]. In, 2016 the progress against this initiative showed appreciative achievement, for instance the consumption of water at Unilever is dedicated in four areas of the Unilever value chain, such as required for growing crops, for manufacturing products, when consumers use Unilever products, when factories add water in the form of product manufacturing ingredient, the following figure represents the percentage acquisition the dedicated water usage at Unilever (Figure 5):

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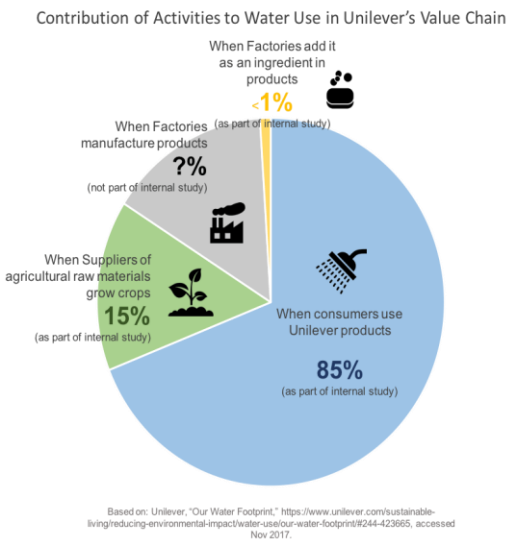

Figure 5: Unilever water usage statistics.

It was observed that usage of water is causing a decrease in number of consumers at Unilever, therefore, resolving this problem with USLP initiative has worked with potential progress and a significant amount of water consumption is reduced till, 2019. For this the company deployed the innovative technique of drip irrigation that is aimed to reduce water consumption by 50% [61]. Along with this, the other targets of USLP initiative included the ½ parts reduction of greenhouse gases by, 2020, control of waste production to attain ½ parts reduction by, 2020 and attain sustainable sourcing of raw materials [62]. For this, Unilever also initiated its Carbon Disclosure Project (CDP) that attains a prominent position for controlling carbon emissions since its induction [63]. These indicators determine the relationship between the supply chain characteristics and manufacturing strategies at Unilever, as for taking action to establish environment sustainability the initiatives require a connection of supply chain activities and manufacturing strategies at this company (Figure 6). In order to determine the achievements of Unilever, the following metrics were obtained from its reports for, 2010-2019 and the values were mapped in the chart representing the trends of achievement until, 2019:

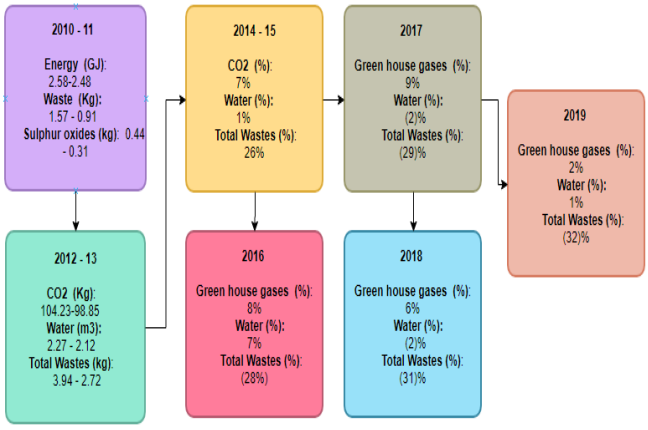

Figure 6: Unilever USLP achievements from, 2010-2019.

Discussion

As observed from the literature that SC integration is considered as a significant characteristic forming relationship with manufacturing strategies of a company – implying this against the SC characteristics of Unilever, it is found that Unilever adopts SC integration is a vital component that strengthens its SC and cause it to become a globally recognized icon [25]. For instance, SC integration refers to formulating a relation between internal and external activities impacting on the manufacturing strategies of an organization – such that it provides strategies to deploy a cost-effective paradigm and cause an increase in the response rate. For the case of Unilever, it follows vertical integration, referring to incorporate a greater number of companies for completing its product manufacturing process [57]. Therefore, it is evident that Unilever SC integration causes significant impacts on its manufacturing strategies – as a strong and optimum integration can result in the manufacturing of successful and cost-effective products whereas if the activities are not organized with a directive approach, then it may cause a potential loss to product quality due to inapt manufacturing strategy.

Other than this, a series of literature has identified innovation as a stronger component establishing a relationship between SC characteristics and manufacturing strategies [38,39,41,42]. For Unilever, its SC integration and geographical dispersion strategies are based on innovation that is considered to be deployed as its manufacturing strategies – such as the partnership with Ampere Life Sciences based in Silicon Valley illustrates that the company deploys advances of biotechnology for manufacturing its consumer products. Other than this the merger with Liver Proof, a recognized brand to provide scientific solutions for curing hair problems provides example for the deployment of innovation in its manufacturing strategies obtained with SC integration and SC geographical dispersion. Also, another example is the partnership with Dollar Shave Club in, 2017 that is a recognized brand for providing distinct solutions *via* its innovative shaving and grooming products to its consumers [63]. In addition to this, the significant expenditure for its R & D and the history of successful products based on innovative techniques reflects that Unilever R & D department provides massive support to drive innovation in its manufacturing strategies that is strengthened by SC integration and geographical dispersion.

The SC characteristics such as visibility and flexibility are other two concerns that define the relationship with manufacturing strategies and supporting organizational growth [13]. Where, visibility is meant to provide access of information of SC activities to its potential suppliers and other involved entities of manufacturing and SC department. For the case of Unilever, it needs a well-organized framework for its suppliers and third-party companies followed by transparency model, where visibility of SC becomes clearly identified [64]. According to Brusset, SC visibility provides strong impact on the manufacturing strategies and business performance. For the case of Unilever, it provides a prominent SC visibility, that impact on its manufacturing strategies, such as the deployment of drip irrigation process [61]. On the other hand, SC flexibility refers to the speed of the SC activities that with the changing environment to retain the competitive advantage – for these higher capabilities of logistics, inventories, warehouse and manufacturing capacities are required. For the case of Unilever, the company holds a potent infrastructure of inventories, warehouse, logistics and manufacturing capacities; therefore, its SC is flexible and impacts on its manufacturing strategies. The variety of products manufactured by Unilever reflects the flexibility of its SC, this

suggests the company is capable to adopt with changes and produce diverse products for meeting the varied demands of users [65-72].

Conclusion

The research identified that SC characteristics such as integration, geographical dispersion, flexibility and visibility results with considerable impact on the manufacturing strategies of Unilever. For instance, the SC characteristics such as integration and geographical dispersion significantly support innovation that directs the manufacturing strategies of Unilever towards innovation. Every year the company looks to identify distinct approaches to foster innovation in its business model objectifying sustainable growth. For this, USLP is an appreciative initiative by Unilever that supports innovation by considering environment sustainability goals establishing a strong relationship between SC characteristics and manufacturing strategies of Unilever. Also, leadership plays an important role in this context, such as the initiative of USLP and its success revolves around strategic approach of leadership at Unilever. This approach motivates each employee in the organization making them responsible to stand with their actions.

On top of that, another important factor which on which the Unilever is relying is Visibility and Flexibility. These are helping Unilever to focus more on performance review and monitoring, from the supplier selection stage till putting the product on the shelve.

Recommendations

The company's SC characteristics formulate a considerable relationship with its manufacturing strategies, where innovation and leadership are found as significant factors impacting this relationship. Despite the company is working with strategic approach, recommendation for deploying e-supply chain and integrating Artificial Intelligence (AI), Virtual Reality (VR) and Augmented Reality (AR), can enhance its productivity with significant improvement. The implementation of such information AI systems will help to understand the trends with a next level monitoring as well as resolution such as developing core strengths, providing real-time information on the supply demands, integration of all the markets around the world which is accessible with an ease at your fingertips, provide clarity of all the key performance indicators which is really crucial for improvements and to navigate any possible lake in performances, cooperation and to interconnect multiple departments to provide visibility and partnerships in various supply-chain operations in order to achieve the sustainability approach.

Limitations and future study

The study discussed SC characteristics such as integration, flexibility, visibility and geographical dispersion impacting on manufacturing strategies where innovation is identified as a prominent factor. Yet, the discussion for e-supply chain can further enhance the scope of this study. Therefore, future directions of this study could be for e-supply chain evaluation for Unilever.

Conflict of interest

The author declares no conflict of interest.

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