

# The Sustainability Strategies in the Pharmaceutical Supply Chain: A Qualitative Research



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**Abstract:** Sustainability in the pharmaceutical integrated supply chain ecosystem is understood as a balance between environmental, social, and economic pillars. Therefore, indicators for sustainability development in pharmaceutical industries therefore must cover all three dimensions of sustainability. The traditional supply chain was more about reducing costs and maximizing revenue and profit. Now the corporate goal is also about considering the environmental and social impact of their products and services journey through the entire value chain — from plan to source, to make, to deliver, to the service domain. Sustainability as part of corporate responsibilities is now mandatory to be mentioned as part of the broader commitment to safeguarding the planet. This multiple qualitative case study aimed to investigate the role of sustainability in the efficient pharmaceutical supply chain. Sustainability is also the key driver for the long-term growth of a pharmaceutical company. The study involved interviewing various pharmaceutical managers with proven strategies for implementing sustainability-related strategies. The theory of constraint was used as the conceptual framework for this qualitative multiple case study. Data from interviews and supporting documents were analyzed using data triangulation to discover themes. Three main themes emerged from data analysis: (a) known or unknown constraints, (b) business operational model change, and (c) training and building sustainability capability. Seven key strategies were developed pertain to these three themes. These themes were identified based on interview data inputs and documentation provided by participants. Identified themes and strategies are summarized in the system model. Researchers and industry leaders can utilize themes and strategies to identify constraints, risks, and issues in the current system and work towards a sustainable supply chain integrated ecosystem.

**Keywords:** Sustainability, Pharmaceutical, Supply Chain, Digitalization.

## I. INTRODUCTION

Surprisingly confirmed that the pharmaceutical industry is significantly more emission-intensive (55% higher) than the automotive industry [12]. As per McKinsey's research, the supply chain is the reason for 90% of companies' environmental impact. The toxic chemicals used in pharmaceutical production processes represent a severe threat to the environment and sustainability. A significant amount of

waste is generated which is hard to dispose of. Pharmaceutical industries are also heavily reliant on a large volume of water for formulation processes, production, and cleaning. Another aspect of social sustainability in the pharmaceutical industry is developing and enhancing the community socially and economically. Increasing employment opportunities and providing balanced economic development for local communities is the main goal of social and economic pillars of sustainability [21]. Sustainable supply chain management encompasses both social and economical goal while ensuring that the economic viability to achieve those goals generates a long-term advantage for the organization [4]. Implementing a sustainable initiative in the pharmaceutical supply chain is quite similar to an operation initiative implemented after all the tradeoffs are evaluated. The lack of sustainability severely impacts a company's profitability, and it is not only the environment that is losing out. Unilever reported an annual loss of €300m directly associated with climate change [13]. The pharma industry's contribution to environmental issues is expansive and linked to water and energy consumption, global distribution, large plant and warehouse footprints, R&D, the supply chain, and transport logistics [12]. There is an ever-increasing consensus that environmental impacts (EIs) left uncontrolled, may result in major changes to both the climate and the environmental systems [21]. Governments are under immense pressure to enact legislation to curb these impacts. These restrictions, which include controlling greenhouse gas emissions, more specifically carbon dioxide (CO<sub>2</sub>), are becoming a growing interest and companies are being urged to incorporate these issues into supply chain management schemes [21]. Among these mechanisms and legislation, carbon emission trading or the cap-and-trade system is generally accepted as one of the most effective market-based mechanisms, which the EU and UN have broadly accepted [21]. Pharmaceutical organizations continue to lose millions because of spoilage from temperature fluctuations and potential hazards for patients and subsequent regulatory actions [12]. With the right supply chain partner, a pharma company transporting 1 billion vaccine doses could save 1 million MWh and 340 million gallons of water, as well as reduce landfill contributions by 3 million kg and CO<sub>2</sub> emissions by 120 million kg [12]. Many firms are now making a pledge toward sustainability and investing in that. Big pharmaceutical companies, such as Novartis, Genentech, and Johnson & Johnson signed the American business activities pertaining to the climate pledge in the year 2015.

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These companies are steadily demonstrating their sustainability commitment by reducing water usage, carbon and greenhouse emissions, and waste in landfills. They are also showing commitment to using renewable energy.

## II. PROBLEM STATEMENT

The most crucial challenge of the pharmaceutical supply chain is to maintain sustainability by reducing carbon footprints, water usage, waste and enhancing the socioeconomic aspects of local communities. The general business problem is that some pharmaceutical managers lose supply chain efficiency, profitability, and business by not maintaining sustainability in their processes. The specific business problem is that some pharmaceutical managers lack strategies to implement sustainability-related measures.

## III. RESEARCH QUESTION

The primary research question for this study was: What strategies do pharmaceutical supply chain managers use to improve sustainability to remain profitable?

## IV. RESEARCH METHOD

This qualitative multiple case study aimed to explore the strategies pharmaceutical managers use for improving sustainability metrics to remain profitable. My target population included pharmaceutical supply chain managers who implemented these strategies to improve their systems. The Purposive sample was used to select supply chain managers.

## V. THEORETICAL FRAMEWORK

The conceptual framework selected for this study was the theory of constraints (TOC). Eliyahu Goldratt's (1990) TOC is a system-based management philosophy to understand and identify the root causes that limit a system from achieving higher performance [7]. With TOC, digital supply chain managers can formulate a robust design strategy in the early phase, continuously improving the digital processes by identifying and analyzing constraints and solutions for every step of the digital supply chain system [16]. The TOC may help in providing the insights needed to determine why a non-digitalized cold chain system fails to achieve the organization's goals. A constraint is defined as an element of the factor that limits the system from doing what it was designed to accomplish [7]. Constraints hamper the progress or increased throughput of an organization. Thus, the firm's failure to manage this constraint leads to declines in its productivity. The same TOC analogy can be made to the supply chain, where a non-sustainable supply chain system can limit the entire supply chain's effectiveness and efficiency [16].

## VI. LITERATURE REVIEW

Sustainability is protecting stakeholders' interests by focusing on non-financial environments, such as environmental, social, ethical, and governance, by accomplishing financial performance and creating stockholders' s value [20]. Sustainability is described as meeting the present's needs

without compromising environmental generations to meet their own needs [11]. As defined by the triple bottom-down sustainability theory, supply chain managers must consider social, economic, and ecological objectives while deciding to make their business profitable [17]. Sivarajah et al. (2020) further stated that organizations must give back to the communities they operate and must take initiatives to replenish and conserve natural resources to provide services and manufacture tangible products [17]. Each sustainability type is discussed below in detail, starting with environmental sustainability. Globalization has prompted organizations to build highly interconnected and complex supply chains. As a result, companies adopt the outsourcing model to outsource non-core activities to overseas suppliers without much consideration [16]. The shift toward outsourcing and waste and emission caused by production processes throughout the global supply chain is the primary source of environmental issues [2]. In the current operating model, there has been an increase in third-party logistics and transportation (TPL) providers who were outsourced to serve the developing countries' supply chain. The major challenges to environmental sustainability in developing countries include a serious lack of collaboration between third-party logistics providers, a lack of governmental regulations for environmental standards, a lack of environmental policy initiatives and commitment by management, and a relatively immature stage of economic development in developing countries [6]. The need to coordinate activities between supply chain partners to satisfy environmental regulations imposed by governmental legislation and the requirement to improve the company's environmental profile for their potential customers are now deemed necessary for the organizations [21]. The manufacturing processes may consume energy and materials and, in the process, release waste also in the ecosystem. Even the global supply chain's transportation process may adversely impact the environment regarding energy used and discard pharmaceutical raw material mismatch at source and destination. Nowadays, end customers are demanding eco-friendly products and services that do not damage the environment [9]. The demand from intermediate and end customers is now pushing manufacturers to rebuild or modify their operations. Ashby (2018) suggested using the closed-loop supply chain by taking example from the clothing industry, where the local firm, customers, and global suppliers coordinate in a way that follows appropriate environmental practices by initiating the reverse flow of used clothing toward maximizing the value and minimizing the waste in global supply chain lifecycle [2]. Implementing green SCM will improve environmental performance regarding fewer carbon footprints and help the competitive advantages and economic performance of an organization [1]. Social sustainability in the supply chain also plays a substantial role, as supply chain managers and partners must address stakeholders' needs and human capital to achieve long-term sustainable results.



Socially sustainable supply chain practices are defined as introducing a range of initiatives, including protection against child and slave labor, health and safety programs for employees, outreach to communities, and supporting human rights [5]. Organizations have adopted social and environmental sustainability practices to reduce their carbon footprints and improve their image on the social front [8]. Organizations that adopt sustainable practices in their supply chain processes outperform their competitors in stock market performance and financial metrics [18].

## VII. FINDING OF THE RESEARCH

I have used ATLAS.ti, and codings are done to identify appropriate themes. ATLAS.ti is a qualitative research tool that can be used for coding and developing themes using interview transcripts, documentation, and field notes. It also provides in-depth insights into data visualization. I have used the word cloud feature in ATLAS.ti to show the visual representation of all the words during interviews with the participants. During data analysis, three main themes emerged: (a) known or unknown constraints, (b) business operational model change, and (c) training and building capacity. Seven key strategies were developed pertaining to these three themes. These are discussed in detail:

### Theme 1: Known or unknown constraints

The first theme that emerged during the interviews was the identification of constraints in the current supply chain system. All participants emphasized the need to work through first and identify the known issue or constraints in their supply chain system. Participants' interview data and documentation suggested that an analysis of the current system must be done before deciding on the next step. Identification of all known or unknown constraints must be part of the supply chain system analysis. The following two key strategies emerged pertain to the first theme:

#### 1. Work through identified constraints

The major constraints that leaders of a pharmaceutical company face include (a) over-dependency on third-party manufacturers (contract manufacturing), (b) cold chain process for transporting biopharma products, (c) Special packaging requirements. The other constraints include (a) over-relying on single sourcing vendors for raw materials (active pharmaceutical ingredients and active biological ingredients) and not improving continuity of supply by shifting to multiple suppliers in a different part of the world, (b) non digitalized system. Based on all the constraints, pharmaceutical companies need to develop their vision to implement various measures related to sustainability. Developing vision provides direction and clearly describes the big picture in the short and long term. Developing a vision is also one of the critical metrics for cultural change to bring digital transformations.

#### 2. Locate and map critical sustainability issues across the supply chain

To understand the impact, organizations must analyze how natural or human resources are used at each stage of the supply chain, such as production, sourcing, and transportation. Organizations must map supply chain

processes with a comprehensive understanding of the sustainability impacts. Several organizations, such as TSC, the world wildlife fund (WWF), the sustainability accounting standard boards, CDP, and the global reporting initiatives, offer measurement frameworks and instruments that can help companies find the most critical sustainability issues across their supply chain [3]. LEED (leadership in energy and environmental design) certification helps pharmaceutical organizations provide a framework for highly efficient, cost-saving green buildings [15]. The certification independently validates that building design, construction, operations, and maintenance are energy and resource-efficient [15]

### Theme 2: Business operational model change

The second theme that emerged during the interviews was the need for a modified business model to work through the sustainability issue mapped in each stage of the current supply chain. The sustainability team in a pharmaceutical organization can be internal, belonging to the company, or external, belonging to some NGOs. These teams can be tasked with a specific task in sustainability that pertains to particular problem areas such as logistics (efficient transport, repackaging, fuels), sourcing, and environmentally responsible procurement activities. They are also assigned to evaluate financial benefits based on all sustainability-related measures. External agencies may help to create and communicate a uniform code of sustainable action industry-wide. Digitalization also plays a significant role in improving sustainability indicators. The following three key strategies emerged pertain to the second theme:

#### 1. Innovating packaging design and materials

The pharmaceutical companies do have stringent regulations regarding the safety of the packaging. Packaging must be temper resistant and, unlike other industries, meant for single use. Reusing or refilling is not possible in pharmaceutical industries. Pharmaceutical companies must work towards innovating packaging material instead of just using single-use conventional blister packaging. Recent innovation happened in the form of the development of polyolefin laminate as an alternative packaging material that is 70% recyclable and may lower the packaging-associated cost by 60% [15]. There is also innovation around using bioplastic derived from renewable plant-based biodegradable sources and bio base effervescent tablet packaging derived from corn and sugarcane [15].

#### 2. Digitalization by implementing digital enablers:

Organizations have already acknowledged the significant impacts of innovative digital technologies, as enablers of sustainable initiatives and for improving supply chain performances (Fuchs, 2008). Digital enablers, such as blockchain can help track and trace whether products are environmentally produced and shipped (Anna, 2020). Blockchain traceability can also help determine social sustainability aspects if fair and safe work practices are followed and human rights were not violated in producing the products and services.





### VIII. APPLICATION TO THE PROFESSIONAL PRACTICE: SYSTEM MODEL

I have developed a system model as the outcome of this research (see figure 1). A direct relationship variable will help improve the efficiency and inversely related variables will negatively impact the pharmaceutical supply chain systems. The non-sustainable supply chain will impact profitability and slow down pharmaceuticals organization's growth by poor sustainability performance measured by various metrics. Traditional organizations are primarily focused on financial metrics, such as return on investment (ROI) and internal rate of return (IRR). Sustainable organizations also measure environmental metrics and social metrics. Environmental metrics measure factors such as carbon emission reductions, fuel consumption during transportation, waste and pollution, water usage, and electricity consumption. Social metrics measure factors such as the health and well-being of employees and other stakeholders involved in the supply chain ecosystem.

The efficiency of the supply chain is not only dependent upon the speed and reliability of operations. It also depends upon sustainability. A non-sustainable supply chain will impact any investment decisions by its current and future potential investors. A business with a sustainable supply chain is a beneficial and attractive prospect for any other company looking to partner with it [4]. The sustainability credentials and metrics open many doors to potential partnership opportunities. In a survey, 88% of investment managers said that supply chain sustainability will be the key criterion for investment decisions for the next 10 years [14]. 80% also believed that businesses without supply chain sustainability will struggle to access capital, indicating that companies that do not act now risk inhibiting their future growth [14]. Sustainability also reflects corporate culture. It also helps organizations in attracting top talents, typically among new generations who are very much concerned about environmental aspects. Organizations must identify sourcing vendors who have proven expertise in a sustainable business. There will be a risk of system degradation if supplier's code of conduct is not established based on their past sustainability performances. A non-digitalized supply chain can degrade the system as there will be no visibility of critical sustainability metrics and organization performance. Digitalized sustainability dashboard can help improve the system by displaying all essential sustainability metrics and the actionable items for the organizations. The dashboard may provide visibility to internal and external stakeholders in the organization.

### IX. CONCLUSION

Achieving sustainability goals is prized asset, and pharmaceutical businesses that understand how to make that work will be able to bring investors, regulators, and consumers on their side. As per Gartner's research, sustainability has impacts that span the entire value chain-from plan to source, to make, to deliver, to the service domain. To respond to this issue, and in addition to the cap-and-trade approach, companies tend to adopt more

energy-efficient technologies, equipment, or vehicles during transportation. Sustainability goals can also be approached by optimizing production decisions, facility locations, transportation, and inventory [10]. An optimized supply chain network design (SCND) toward sustainability can not only correspond to economic beneficiary for organizations but also lead to a significant change in social and environmental impacts [22].

Digitalization plays a significant role in improving sustainability indicators for all three pillars: environmental, social, and economical. As per Gartner's research, supply chain leaders who don't invest in digital strategies and digital enablers that support a wide range of sustainability goals and metrics risk a significant impact on brand, company image and consumer value perception.

The study recommends further research using bigger sample populations and different geography. I have used qualitative research methodology for this study. Quantitative or mixed method research method can be used for future research.

### REFERENCES

1. Alzaman, C., Zhang, Z.-H., & Diabat, A. (2018). Supply chain network design with direct and indirect production costs: Hybrid gradient and local search based heuristics. *International Journal of Production Economics*, 203, 203–215. <https://doi.org/10.1016/j.ijpe.2018.06.004> [CrossRef]
2. Ashby, A. (2018). Developing closed loop supply chains for environmental sustainability: Insights from a UK clothing case study. *Journal of Manufacturing Technology Management*, 29(4), 699–722. <https://doi.org/10.1108/JMTM-12-2016-0175> [CrossRef]
3. Bove, A. T., Swartz, S. (2016). Starting at the source: Sustainability in the suppl supply chain. <https://www.mckinsey.com/business-functions/sustainability/our-insights/starting-at-the-source-sustainability-in-supply-chains>
4. Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: Moving toward new theory. *International Journal of Physical Distribution & Logistics Management*, 38(5), 360-387. [CrossRef]
5. Croom, S., Vidal, N., Spetic, W., Marshall, D., & McCarthy, L. (2018). Impact of social sustainability orientation and supply chain practices on operational performance. *International Journal of Operations & Production Management*, 38(12), 2344–2366. <https://doi.org/10.1108/IJOPM-03-2017-0180> [CrossRef]
6. El Baz, J., & Laguir, I. (2017). Third-party logistics providers (Tpls) and environmental sustainability practices in developing countries: The case of Morocco. *International Journal of Operations & Production Management*, 37(10), 1451–1474. <https://doi.org/10.1108/IJOPM-07-2015-0405> [CrossRef]
7. Goldratt, E. M. (1990). *Theory of constraints*. North River.
8. Gouda, S. K., & Saranga, H. (2018). Sustainable supply chains for supply chain sustainability: Impact of sustainability efforts on supply chain risk. *International Journal of Production Research*, 56(17), 5820–5835. <https://doi.org/10.1080/00207543.2018.1456695> [CrossRef]
9. Green, K. W., Inman, R. A., Sower, V. E., & Zelbst, P. J. (2019). Impact of JIT, TQM and green supply chain practices on environmental sustainability. *Journal of Manufacturing Technology Management*, 30(1), 26–47. <https://doi.org/10.1108/JMTM-01-2018-0015> [CrossRef]
10. Hua, G., Cheng, T.C.E., Wang, S. (2011). Managing carbon footprint in inventory management. *International journal of production economics*, 132(2). <https://doi.org/10.1016/j.ijpe.2011.03.024> [CrossRef]

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11. Maniora, J. (2018). Mismanagement of sustainability: What business strategies makes the difference? Empirical evidence from the USA. *Journal of Business Ethics*, 152(4), 931-947. <https://doi.org/10.1007/s10551-018-3819-0> [CrossRef]
12. McHarg, J. (2021). The sustainable supply chain: Delivering better outcomes for patients and the environment. <https://pharmaceuticalmanufacturer.media/pharmaceutical-industry-insights/pharmaceutical-logistics-distribution/the-sustainable-supply-chain-delivering-better-outcomes-for/>
13. Nutburn, M. (2019). Five benefits of a sustainable supply chain. <https://www.cips.org/supply-management/opinion/2019/july/five-benefits-of-a-sustainable-supply-chain/>
14. Proxima (2022). What are the risks of not making your supply chain sustainable. <https://www.proximagroup.com/what-are-the-risks-of-not-making-your-supply-chain-sustainable/>
15. Schaller, V. (2022). 4 ways to create a more sustainable pharma brand. <https://sgkinc.com/en/insights/single-insight/4-ways-to-create-a-more-sustainable-pharma-brand/>
16. Shashi, Manish (2022). Digital Strategies to improve the performance of pharmaceutical supply chains. (Publication No. 28966332). ProQuest Dissertations and Theses Global
17. Sivarajah, U., Irani, Z., Gupta, S., & Mahroof, K. (2020). Role of big data and social media analytics for business-to-business sustainability: A participatory web context. *Industrial Marketing Management*, 86, 163–179. <https://doi.org/10.1016/j.indmarman.2019.04.005> [CrossRef]
18. Sodhi, M. S., & Tang, C. S. (2018). Corporate social sustainability in supply chains: A thematic analysis of the literature. *International Journal of Production Research*, 56(1–2), 882–901. <https://doi.org/10.1080/00207543.2017.1388934> [CrossRef]
19. Wollmuth, J., & Ivanova, V. (2014). 6 steps for a more sustainable supplychain. <https://www.greenbiz.com/article/6-steps-more-sustainable-supply-chain>
20. Zabihollah, R. (2021). Business sustainability: Profit with purpose focus. Business expert press.
21. Zahiri, B., Zhuang, J., Mohammadi, M. (2017). Toward an integrated sustainable supply chain: A pharmaceutical case study. <https://doi.org/10.1016/J.TRE.2017.04.009> [CrossRef]
22. Zissis, D., Saharidis, G. K. D., Aktas, E., & Ioannou, G. (2018). Emission reduction via supply chain coordination. *Transportation Research Part D: Transport and Environment*, 62, 36–46. <https://doi.org/10.1016/j.trd.2018.01.014> [CrossRef]

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