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A Review and Study to Evaluate the Efficiency of Decision-Making in Supply Chain Industries Using DEA Approach

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ABSTRACT: In recent scenario markets are becoming more volatile or unpredictable, supply chain rivalry is becoming more significant, and as a result, firms need to make active efforts to strengthen their competitiveness in these channels. The majority of experts and organizations are of the opinion that sustainable development is critical. An illustration of this would be progress that accounts for the requirements of the present without sacrificing the possibility of other periods to meet those prerequisites. To put it another way, sustainability is achieved when a firm is able to meet the needs of both its present shareholders and those it will have in the future without jeopardizing its potential to be profitable in the long run. Particularly throughout the last several years, designers have been making attempts to boost the ecological or ecological presentation of industrialized methods and final goods, with the end objective of embracing the sustainable supply chain theory. The nine sub-criteria for the three major criteria (Economic Performance Measure, Environmental Performance Measure, and Social Performance Measure) used in this research were identified as Supplier Cost, Delivery Cost, Manufacturing Cost, Lead time, Rejection, Landfill Waste, Energy Usage, and Revenue Growth. These sub-criteria were identified using the research. Inefficient DMUs have the potential to gain knowledge from and model their own practises after those of the benchmarking set or reference set, which is comprised of DMUs whose efficiency is equal to 1. In its computations, this method uses VRS, a kind of return to scale that is more precise than CRS.

KEYWORDS: DEA, Stochastic Frontier Analysis, CRS, DMU, VRS, Supply Chain Industries

I. INTRODUCTION

Supply chain competition is becoming more important as markets become more volatile or unpredictable, thus businesses need to make concerted efforts to increase their competitiveness in these channels. Most authorities and groups agree that sustainable development is essential. Progress that reports the demands of the present without trading off the potential of future eras to satisfy those needs is an example of this (Reefke, 2010). To put it another way, sustainability is when a company is able to fulfil the demands of both current and future shareholders without compromising its long-term viability. With the goal of incorporating the sustainable supply chain theory, designers have been making efforts to increase the ecological or ecological presentation of industrialised procedures and final products, particularly during the last several years (Ingwersen and Stevenson, 2012). Supply chain management is the practise of disseminating information about materials and finances across a business to better serve customers and improve the supply chain as a whole. Management of a company's supply chain in a sustainable manner is a hot topic in the sustainability community (Ashby et al., 2012). In recent years, sustainable supply chain management has emerged as a key strategic focus for businesses throughout the world (Seuring, 2012). According to Seuring and Muller, "sustainable supply chain management" (SCM) is "the management of solid, data, and wealth flow as well as collaboration between organisations along the supply chain while taking sustainable objectives after entirely three dimensions of sustainable growth, i.e., financial, ecological, and social needs obtained from customers and shareholders" (emphasis added) (2008). Increased financial execution (Bai et al., 2012; Tajbakhsh and Hassini,



2015;Motevali et al., 2016;Reefke and Trocchi, 2016), lower asset consumption (Hervani et al., 2005;Sloan et al., 2010), less natural contamination (Sloan et al., 2010;Schaltegger and Burritt 2014), and fewer negative effects are some of impact society in terms of health and safety (Luthra et al., 2016;Varsei et al., 2014), promoted ethical management in the stockpile system, technological progress and innovation (Hassini et al., 2012), etc.

Supply Chain

Organizations have a responsibility to boost their efforts to increase efficacy in Supply chains amid choppy and unpredictable marketplaces (Andersen and Skjoett-Larsen, 2009). As a result, supply chain is crucial to maintaining competitiveness in the global marketplace and The improvement of financial results. At produce and distribute items in correct quantities, to the precise area, and at the best time instruction to lower system-wide expenditures thoughachieving service level needs, a supply chain is in place. Merchants provide the unprocessed or raw material, manufacturers transform it into completed products, warehouses store and distribute them, and finally, retailers and distributors bring them to consumers. In a market economy, supply chains are the catalyst for price changes, since without them, no manufacturer can meet the demands of customers for the products they want at the prices they're willing to pay.

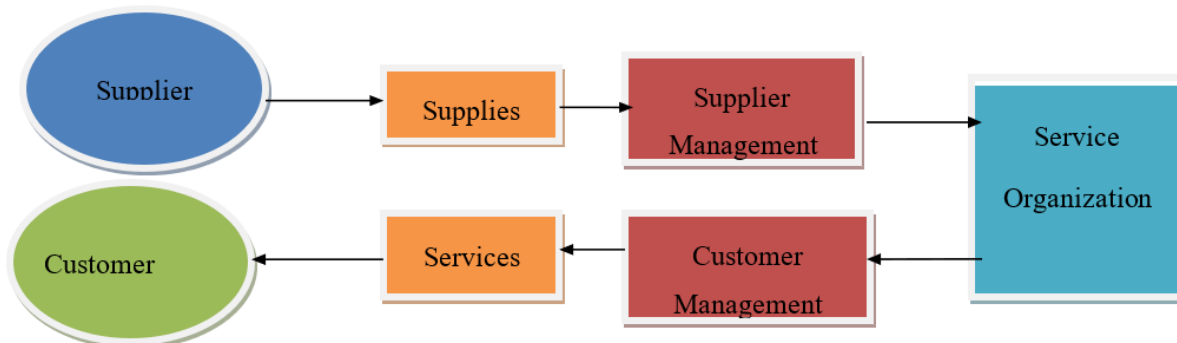


Figure 1.1 Main Components in supply chain Source: (Bowersox et al. 2002)

Difference Between Supply Chain and Sustainable Supply Chain

Measurement of data, money, and items along with their movement from suppliers to manufacturers to retailers (providers) are all part of supply chain management, which is also known as the "inclusion model." More accurately, "supply network" or "supply web" may be used (Chopra and Meindl, 2012). However, a more forward-thinking sustainable supply chain is produced when environmental, public, and economic components are included to the supply chain. In conventional supply chains, maximising output—that is, maximising general worth—is the top priority; in sustainable supply chains, minimising environmental risk and maximising corporate value are at the forefront.

II. LITERATURE REVIEW

Even while sustainability has received a lot of attention and support from the theoretical community, it remains a growing movement with many undefinable static, continuous aspects. Organizations that have adopted sustainability tend to be highly focused and motivated, according to the study (Signori et al., 2015). Successful businesses must have a well-oiled supply chain to thrive. In any case, they need careful attention to management (Adbenjo et al., 2006). The result is a significant competitive advantage for the company. This chapter provides an overview of the primary conceptual and theoretical underpinnings of Sustainable Supply Chain Management. Managers no longer keep their firms running based on the only metric of increasing economic and financial returns to shareholders.



There are several convincing arguments for integrating sustainability into supply chain management, such as the fact that business leaders are under increasing pressure to broaden sustainability's scope to include social and environmental goals (Hervani et al. 2005). These factors have emerged after a number of causes, including the depletion of normal assets, the imposition of controlling rules by demanding customers and administrations, the occurrence of unpredictable weather, and the infringement of trademarks as a result of the introduction of substandard working conditions in provider plants located in distant countries (Luthra et al. 2016). It's useful for gaining a leg up on the competition (refkee, 2010). Not only that, but its carbon and ecological footprints are reduced. Journal articles on sustainable supply chain management were compiled via a comprehensive search of many online databases, including Science Direct, Taylor & Francis Online, Emerald, Springer, Inderscience Online, and the IEEE Xplore Digital Library. This chapter of the dissertation comprises of a definition of SCM, an evaluation of SCM practises, a short discussion of the performance measurements that have been identified, and some last thoughts on the literature study.

Definitions of Sustainable Supply Chain management

Sustainable supply chain management may be defined in a variety of ways. Researchers and practitioners have different ideas and sometimes overlap. Modern manufacturing systems include sustainable supply chains because they consider an organization's environmental footprint. While different specialised businesses have different definitions of sustainability, the one constant is a focus on the social, economic, and environmental components of a business at the same time. The following are some definitions that will help us get a general idea of what a sustainable supply chain entails.

Table 2.1 Summary of Various definitions of sustainable supply chain management

Sr.No	Definition	Reference
1.	A supply chain management that consists of four themes • Planning • Coordination • Execution • Collaboration	Reefke and Sundaram (2016)
2.	Sustainable supply chain management is a path that develops a positive circumstance for supply chains operations	Hussain (2015)
3.	Sustainable supply chain management worries with negative outcomes on the earth because of generation and utilization process.	Genovese (2014)
4.	Sustainable supply chain's duty is to rehearse and accomplishes higher effectiveness and resource utilization.	Chun-Mei Su et al.(2014)
5.	A sustainable inventory network must keep up financial feasibility while doing no damage to social or natural framework.	Signori (2013)



6.	Sustainable supply chain management constitutes of natural, social and monetary measurements in which management of waste is one of the real difficulties.	Bai (2012)
7.	It is the management of supply chain processes, possessions, information, and maintenances by a particular conclusion objective to amplify the supply chain help while in the period in-between preventive the natural	Hassini (2010)
8.	Development that expatiate issues of the Present without endangering capacity of future eras to address their issues to meet their basic requirements.	Searcy (2008)
9.	It is Holistic and incorporated way to deal with both sustainability and supply chain administration in an organization	Gosling(2005)

Literature Review of Sustainable Supply Chain Management

In-depth literature searches were conducted from 1998 to 2016 for topics related to sustainability and sustainable supply chain organisation. Multiple articles were chosen that address issues of sustainability, supply chain management, and sustainable practises. Even while scholars and practitioners have different terms for the same thing and often disagree on how to approach a problem, their basic interest is still the same. Scholars generally believe that a strong emphasis should be placed on incorporating sustainability into the supply chain.

Gracia-Arca (2013) When a sustainable supply chain bundling coordination strategy is put into action, Gracia-Arca (2013) looked at the characteristics of inner or external change that occur in the organisation in parallel with the supply chain. It considers a proactive inclusion of proficiency and Sustainability in supply chains, which may aid businesses in improving their global perspective on items and bundle configuration to increase both Sustainability and productivity. Sustainable supply chain management entails reaching social and environmental benchmarks within existing supply networks. Management Sustainable product development is a strategic reaction to pressure from governments, businesses, and non-profits. Sustainable supply chain competency evaluation employs data envelopment analysis (DEA) as a technique (Azadi et al.,2014). Different partners indicate extraact pointers about ecological besidescommunity assessments, such as ozone depleting substance outflows and their impact on communities, as shown by studies such as those conducted by Tang and Zhou (2012), Wu and pagell(2011), and Varsei et al.(2014).

III. CONCLUSIONS

The purpose of this research was to shed light on the topic of utilising performance metrics and the DEA method to evaluate the efficiency of decision-making units in a tyre company. Although Stochastic Frontier Analysis (SFA) may be used to evaluate performance, the results are very imprecise and open to interpretation. Supplier Cost, Delivery Cost, Manufacturing Cost, Lead time, Rejection, Landfill Waste, Energy Usage, and Revenue Growth were identified as the nine sub-criteria for the three major criteria (Economic Performance Measure, Environmental Performance Measure, and Social Performance Measure) used in this research, and DEA was applied to classify the sub-categories into groups with the highest levels of performance.



REFERENCES

1. Poppendieck, M. (2007). Lean Software Development. 29th conference on software engineering (pp. 165-166). IEEE.
2. Poppendieck, M., & Poppendieck, T. (2003). Lean software development: An agile toolkit. Addison Wesley.
3. Rahman, S.-u. (1998). Theory of constraints- A review of the philosophy and its applications. International journal of operations & production management, 336-355.
4. Raman, S. (1998). LEAN software development: is it feasible? Digital avionics system conference (pp. C13/1-C13/8). IEEE.
5. Sauter, T., Soucek, S., Kastner, W., & Dietrich, D. (2011). The evolution of factory and building automation. IEEE industrial electronics magazine, 35-48.
6. Shtub, A., Bard, J. F., & Globerson, S. (1994). Project Management- Engineering, Technology and Implementation. Engelwood clifs: Prentice-Hall.
7. Singh, B., Garg, S., Sharma, S., & Grewal, C. (2010). Leans implementation and its benefits to production industry. International Journal of Lean and six sigma , 157-168.
8. Software engineering institute, SEI. (2010). CMMI for development version 1.3. Carnegie-mellon.
9. Sommerville, I. (2005). Integrated requirements engineering: A tutorial. IEEE software, 16-23.
10. SOU 1991:82. (1991). Drivkrafter för Produktivitet och Väststånd SOU 1991:82. Stockholm: Allmäna förlaget.
11. Staats, B. R., Brunner, D. J., & Upton, D. M. (2011). Lean principles, learning, and knowledge work, evidence from a software service provider. Journal of operations management, 376-390.
12. Mantel, S. J., Meredith, J. R., Shafer, S. M., & Sutton, M. M. (2008). Project management in practice. Hoboken: John Wiley & Sons Inc.
13. Melton, T. (2005). The benefits of Lean manufacturing: what lean thinking has to offer the process industries? Chemical engineering research and design, 662-673.
14. Middleton, P. (2001). Lean Software Development: Two Case Studies. Software quality journal, 241- 252.
15. Naftanaila, I., & Brudaru, P. (2009). Lean principles applied to software development- avoiding waste. Economia. Seria Management, 162-170.
16. Ohno, T. (1988). Toyota Production System: Beyond large scale production. Productivity press.
17. Oxford English dictionary. (n.d.). Oxford English Dictionary. Retrieved 12 22, 2011, from OED: <http://www.oed.com.ludwig.lub.lu.se/view/Entry/59732?redirectedFrom=efficacious#eid>
18. Oxford English Dictionary. (n.d.). Oxford English dictionary. Retrieved 12 22, 2011, from OED: <http://www.oed.com.ludwig.lub.lu.se/view/Entry/59736?redirectedFrom=efficacy#eid>
19. Oxford Enligsh Dictionary. (n.d.). Oxford Dictionary. Retrieved 12 22, 2011, from OED: <http://www.oed.com.ludwig.lub.lu.se/view/Entry/59676?rskey=3Ud7Fh&result=3&isAdvanced=false#>
20. Parmenter, D. (2007). Key performance indicator: Developing, implementing and using winning KPIs. Hoboken, New Jersey: John Wiley & Sons Inc.
21. Parnell-Klabo, E. (2006). Introducing Lean principles with agile practices at a fortune 500 company. Proceedings of AGILE 2006 conference (AGILE'06) (pp. 232-242). IEEE.
22. Petersen, K., & Wohlin, C. (2010). Software process improvement through the lean measurement (SPILEAM) method. Journal of system and software, 1275-1287.
23. PMI, Project Management Institute. (2008). A Guide to the project management body of knowledge (PMBOK guide). Newtown square: Project management institute Inc.
24. Poppendick, M., & Poppendick, T. (2007). Implementing LEAN software development: From concept to cash. Boston: Pearson Education, Inc.
25. Poppendick, M., & Poppendick, T. (2010). Leading LEAN software development: Results are not the point. Boston: Pearson Education Inc.
26. poppendieck, M. (2007). Lean Software Development. 29th conference on software engineering (pp. 165-166). IEEE.



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