Research Methodology on Operations Research, Inventory Model and Supply Chain Analytics

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ABSTRACT: The theoretical concepts that underlie this argument can be summarized in two ways. As social science has evolved, scholars have argued over different philosophical concerns that have influenced that growth. There are two sections to the various positions: One user's truth or may not be recognized by others, as per Easterby-Smith et al. (2015); the facts given are not independent of the observer's perspective. That is why it is possible that there are several truths, as opposed to just one, when it comes to presenting the findings of this study's empirical research. Relativism claims that there is no universally accepted truth. Instead, there is a distinct truth to each perspective. According to this study, events & interactions between people are the cause of the phenomenon being studied. In order to gain a better grasp on the ramifications of this phenomena, the researchers dug deeper into the events. Relativism is therefore the ontological perspective of this thesis because each interviewee's perspective and considerations will be different from those of the other interviewees. Because it is being socially created, the authors hypothesize that the events in interest between Supply Chain Analytics and the design process of Supply Chain Networks (SCNs) have taken place. Individuals believe that they create their own social reality, which is known as constructivism, through their beliefs and perceptions of the world around them. Taking a social constructivist epistemological view of Supply Chain Analytics will help the writers acquire a greater knowledge of the social connections between the phenomena and individuals involved by types of measures versus constructed interpretations depending on the interviewees selected .A researcher's strategy is a plan and technique that includes the steps of broad assumptions of detailed procedures of data collection, analysis, and interpretation, as per Ritchie, Lewis, McNaughton Nicholls and Ormston (2014) Deduction, induction, & abduction are three of the most common research methods used in this setting. One of the main differences between inductive and deductive reasoning is that inductive reasoning is based on observations of the world while deductive reasoning is based on theories and testing them against empirical evidence in order to gain insights into the world. The latter is a good way to get a sense of how people see the world and what they think about it. Third, abduction is a third option that incorporates components from both deductive or inductive reasoning into a single strategy (Ritchie et al., 2014). Inductive approach has been recognized and selected as the best appropriate research approach for the study's goal. Since the focus of this thesis is theoretical knowledge gathering empirical evidence, employing a logical approach is quite unrealistic. It was not picked because the study's specific objective demands the collection of theory and empirical data at the same time (Ritchie et al., 2014). For a qualitative research project to be successful, it must be capable of developing new hypotheses or refining old ones, based on empirical data. As a result of the wide range of businesses and industries involved in the SCA phenomenon as well as the special purpose of this study, this study is not constrained by a setting. No or several case studies have been considered as research methodologies other than qualitative research through interviews. SCA's strategic ramifications have been examined using qualitative methodologies. There have been very few qualitative investigations on this issue, and the most of them have used quantitative approaches.

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There is a paucity of theory-based models from such a managerial perspective to explain and understand the issue. As a result, qualitative research methodologies were employed in this investigation in order to better comprehend the various points of view and impressions expressed by the participants. It is possible that the subjective approach will assist the writers get fresh insights into the phenomenon or develop new ideas by finding trends in opinions and beliefs.

KEYWORDS: Supply chain analytics (SCA), Social Science, Relativism, Constructivism, A researcher's strategy and Qualitative research.

INTRODUCTION

When conducting research, it's critical to have a clear plan in place that is consistent with the goals of the study, as well as the research questions and methods being used. What assumptions are established before to conducting research, how data is collected and analyzed, and lastly how the findings will be reported and published should be included in the description of the research design (Myers, 2013). Figure, which depicts the study's development in accordance with the research prototype design offered by Myers, shows an adopted by the researcher design. Starting with the underlying assumptions stated in Research Philosophy, Figure illustrates the process. After that, the chosen study methods and the adopted data collecting and analysis are explained in detail in this part, as well as in Data Collection & Data Analysis.
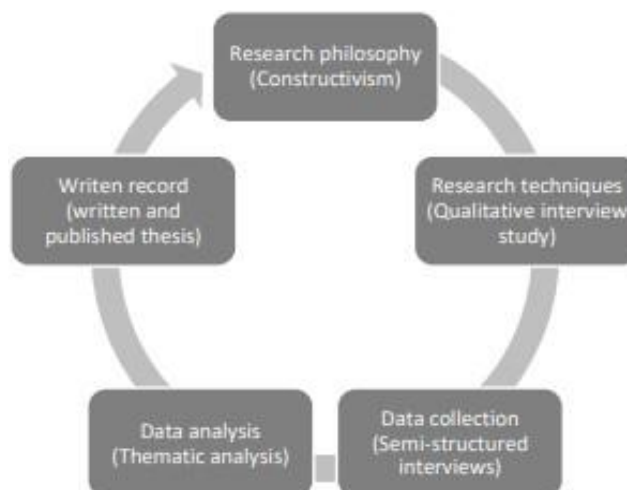

Figure 1: Research design model

It is the researcher's responsibility to select the best strategy for gathering data and then analyze it systematically. Experiment, survey, case analysis, research methods, grounded theory, ethnographic, and archival research are the most frequent research designs. Using a case study design, researchers can go further into their research questions and gain new perspectives on the field as a whole. Qualitative research was used in this study to acquire a greater understanding of SCA from a variety of perspectives and circumstances. Additionally, it will make it possible to conduct research in the area of philosophy (Constructivism) Techniques for conducting research (Qualitative interview study) Compilation of facts (Semi-structured interviews) Analysis of data (Thematic analysis) A written document collection and integration of data from a number of sources to shed light on the thesis's subject. This study's goal is to explore the phenomena of Supply Chain Analytics in a real-world situation, and hence the exploratory qualitative study strategy is the most appropriate method for this study.

DATA COLLECTION

It is possible for researchers to use secondary data or to gather brand-new data (primary data) just for the purpose of conducting research. The study's research questions necessitated the

collection of primary data. As stated in section Research Method, the level of this research depends on a deeper and more thorough understanding. As a general rule, the length and extent of data collecting methods differ. According to Yin (2018), there are six ways to gather evidence: documentation, documentary analysis, direct observation, participating member, forensic evidence, and interviews. The latter was picked because of its 'richness' of information and communication, as well as the reflected insights that respondents received from a relativist standpoint, which made it the best choice. Moreover, the writers interjected, pondered, questioned, and provoked various remarks during the interviews, which characterizes a subjective interview method to obtaining the perspectives and interpretations of the respondents (Saunders et al., 2016). Different sorts of interviews occur in this setting. Unstructured interviews, on the other hand, are defined by listening to others in a verbally descriptive style while focusing on specificity, simplicity, and closing questions. In semi-structured interviews, open-ended and closed questions are combined with naturalness or structure (Gillham, 2005).

As a guide, semi- structured interviews were utilized in this study since they provide a pre-defined structure and can be used to acquire additional viewpoints on the research question. Finally, this will play a major role of the research and adhere to the interview study design chosen by expanding on the current knowledge. This exploratory study relies heavily on the interview questions since they help researchers collect empirical data and, in the end, answer their research questions. Authors gathered data on connections between factors using semi-structured interviews (Saunders et al., 2016). In order to gain a deeper understanding of a topic of interest, open-ended inquiries are preferred. As a result of this more inclusive questioning style, the acquired data can be analyzed from multiple angles and views. It was possible for the authors to conduct 15 interviews without incurring significant trip costs by using Skype or another web-based communication technology. In addition, the interview was less time-consuming for the participants because they didn't have to organize it themselves. In Sweden, three interviews were conducted face-to-face, all-in close proximity to one another. Our interpretation of their comments was aided by their facial expressions and movements during those sessions. Due to lack of time at work, one responder was only able to offer his knowledge by email, and the results was received in narrative form.

DATA ANALYSIS

After gathering empirical data, the research questions were answered by conducting an analysis of the data. With an inductive approach, it was obtained and attempted to gain insight into interview respondents' social contexts, in this study the use of Supply Chain Analytics (SCA) in strategic Supply Chain Network (SCN) decisions and the interviewees' opinions and impressions. Thematic analysis procedures were then followed, providing a standardized and reproducible technique of analysis that is both accessible and flexible. Semi-structured interviews are used to gather the empirical data, which results in a wide range of datasets with varying degrees of precision and scope. The writers were able to familiarize themselves with the data acquired by transcribing and re-reading it at a later date in order to better understand its underlying implications (Saunders et al., 2016). All of the data was then organized into topics gleaned from the literature and coded/labeled accordingly. The same code was used for identical discoveries with the same interpretation, while findings with various meanings were coded separately (Saunders et al., 2016).

This is the next step in thematic analysis, according to Saunders et al. (2016), which entails making judgments about the acquired data and tying sub-themes to main themes or the other way around, as well as analyzing the relationships between the themes. All of these actions

were already done during the coding phase and were considered in an accurate and thorough manner. " Finally, the themes and sub-themes were re-organized so that they could be assigned to the study questions with the use of the coding (Saunders et al., 2016). In order to answer the study question, we re-examined the codes in the established themes to determine whether they are relevant (e.g. '4.4.2 In Supporting Strategic Supply Chain Decisions') or not (e.g. 'Data Problem Examples). The researchers were able to develop propositions and test them to arrive at valid conclusions (Saunders et al., 2016) by recognizing a possible connection between the topics (Saunders et al., 2016). The Standard of the Study Researchers disagree over which contexts should be used when extrapolating results from a sample to the general population or to settings outside the scope of the study. If we look at the authors' agreement from a different angle, the results of a single study may be extrapolated to other contexts or settings not included in the sample (inferential generalization). Research ethics assures that the final test object is valid. This is ensured through testing for four main attributes: validity, internal validity, external validity, and dependability.

VALIDITY

"The 'correctness' or 'accuracy' of a research reading" and "to the extent to which a finding is well-founded and properly represents the phenomenon being examined" are the traditional meanings of validity. Developing an operational set of measures for data collecting is what the researcher needs to do in the second part of the definition In addition, the research must guard against the use of "subjective" judgments . The study has been conducted with a professional and research-oriented focus throughout. Inventory control refers to the monitoring of item supply, storage, and accessibility in order to guarantee a sufficient supply without excessive oversupply. To suit marketing needs, it coordinates the purchasing, manufacturing, and distribution processes. Current sales of items, new products, consumables, replacement parts, obsolescent items, and all other supplies are all part of this position.

The role of demand in a given economy's business sectors is critical. Demand can be either (1) continuous, (2) stochastic, or (3) based on a variety of elements such as selling price, stock of goods, time, and varied offers, new or old goods advertised in a new way, seasonal demands, and so on. In addition to the economic order quantity model, we address the variable backlog rate. Backlogging is assumed to be inversely proportional to the time it takes for the next replenishment to arrive. EOQ (Economic Order Quantity) models make up the majority of existing inventory models for degrading items. Because of its simplicity, the economic production quantity (EPQ) model has been frequently employed in reality. Several research efforts have been made over the last several decades to extend the basic EPQ model by loosening several assumptions so that the model more closely matches real-world scenarios. The traditional EPQ model implies that the manufacturing plant is fault-free, that all goods produced are of flawless quality, and that the quality level is set at an optimal level.

However, in a real-world production environment, product quality is frequently observed to be variable and dependent on the stage of the manufacturing process. Furthermore, defective items are generated as a result of inefficient manufacturing processes. Defective items must be rejected, fixed, and remade, resulting in significant expenditures. As a result, the conventional model's inventory policy may be suitable.

CONCLUSION

Under two separate choice models, a two-echelon supply chain inventory model with configurable lead time is evaluated. One form of the integrated supply chain is presented as a decentralized model, while the other is proposed as a centralized model. The downstream party

can take advantage of the advantages of late payments in purchasing products by using a credit option, subject to a promise to coordinate decision-making. Trade credit finance becomes a great tool to enhance sales and profits in a real-world business via share marketing. In practice, suppliers/retailers provide their retailers/customers a certain duration to settle the payment without penalty in order to increase sales and reduce on-hand stock. Because the amount of capital invested in stock for the duration of the acceptable time is reduced, this permissible payment delay lowers the cost of keeping shares. The store can amass income on sales throughout the delay period and earn interest on that revenue via stock market investment or banking company. A graphical representation of the convexity of the total cost is also offered in this thesis. Sensitivity analysis is used to explain how crucial parameters affect the best solutions. As a result, we investigate the robustness of our findings through a systematic sensitivity analysis of the proposed model's major parameters.

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