Submission of Thesis and Dissertation

National College of Ireland
Research Students Declaration Form
(Thesis/Author Declaration Form)

Name: Abhimanyu Suryaji Domb

Student Number: x19232462

Degree for which thesis is submitted: Masters Degree (Level 9)

Title of Thesis: A Study of Big data Analytic techniques in Operations and Supply chain management

Date: 15/08/2022

Material submitted for award

A. I declare that this work submitted has been composed by myself. ☐

B. I declare that all verbatim extracts contained in the thesis have been distinguished by quotation marks and the sources of information specifically acknowledged. ☐

C. I agree to my thesis being deposited in the NCI Library online open access repository NORMA. ☐

D. *Either* *I declare that no material contained in the thesis has been used in any other submission for an academic award.
   Or *I declare that the following material contained in the thesis formed part of a submission for the award of

   _____
   (State the award and the awarding body and list the material below) ☐

A STUDY OF BIG DATA ANALYTIC TECHNIQUES IN OPERATIONS AND "SUPPLY CHAIN MANAGEMENT'

Abstract

Chapter 1: This chapter has discussed the research background, research aims, objectives, and the research questions about the impact of the "Big data analytic" process in the "Supply chain management". This chapter has also explained the problem statement, significance of the research study and the research rationale about the research study.

Chapter 2: This chapter has discussed the literature review, theoretical interpretations, literature gap and conclusion. The literature review has discussed the role and benefits of the "big data analytics" process. This chapter has discussed the "Grounded theory", "cost transactional theory" and "Agency theory" for the completion of the research topic.

Chapter 3: This study has discussed the method used in the research study to analysis the important factor of big data analysis in the modern business sector. The primary research method is used here to analysis the details factor. This research study is essential for the progression of business in an effective manner.

Chapter 4: This study has discussed the research findings to analyses the research study. In the chapter the researcher has discussed the demographic analysis and described the pie chart related to the various questions that has been provided to the respondents. From this chapter the researcher has got to know various opinion of the population about the impact of data analysing process on the "Supply chain management". The answers from the participants are collected regarding the usefulness of the "data analytics" to the customers and the industry in improving the service.

Chapter 5: The findings section has discussed the concept of big data analytics and its importance in the organisation with positive measures. It also focuses on the tools and techniques for determining the future prediction and meeting the demand and "supply chain management system" with the changing trends in the product, desire, needs and design of the overall product.

Table of Contents

List of Figure

Chapter 1: Introduction

1.1 Introduction

This chapter is going to discuss the introduction of analyzing big data in the Supply chain management system. This research study included the research background, challenges faced by the companies during the adoption of big data analysis, research aims and objectives of the research topic. This research study is also going to discuss the research rationale and significance of this research study.

1.2 Background

Big data processing is a significant process for every retailing and industrial organization that performs great in the market and tries to enhance customer satisfaction. As suggested by Nguyen *et al.* (2018) this data determining process plays an effective role in the organization. The companies in the UK market manage the sales of the products and the supplies by analyzing the data and maintaining the stored information of the customer. The foreign companies and the industrial areas use advanced technologies to keep the enormous amounts of data and illustrate those to make the correct decision for the company.
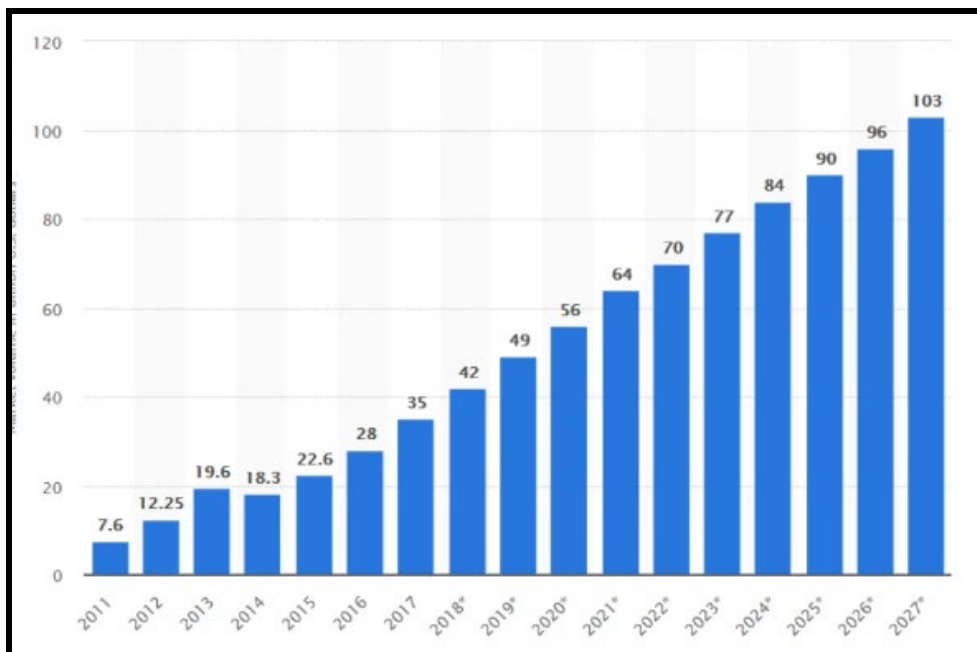
Figure 1.1: Impact of "Big data analytics on supply chain management system"

(Source: Pepperdata. com, 2022)

The mentioned above figure 1.1 shows the effects of the tremendous amount of data analysis process on the supply chain execution increases *by 70% in 2022*. According to the above graph, retail companies have a progressive growth after adopting the big data analysis process. In the past year, the companies were unable to handle the collected data and process the orders to maintain a good supply chain. In the year 2011, the development of the company was not as good as this current year (Chehbi-Gamoura *et al.* 2020). In this modern year, the industrial areas and the organizational companies developed their productivity and increased the supply processes by analyzing the considerable data execution.

1.3 Problem statement

The companies of the UK have faced many problems related to the enormous data analysis. In this modern era, leading companies have used advanced technologies and knowledge about information technology to develop the data execution process. Generally, the administrative areas and the retailing company have collected data from various sources, which sometimes create problems while monitoring those data. As viewed by Govindan *et al.* (2018), sometimes the industrial areas faced challenges related to the complexion of the gathering data. The technology fails to process a vast amount of data at a time and loses the security of the stored data. It affects the companies' development and reduces the growth of products.
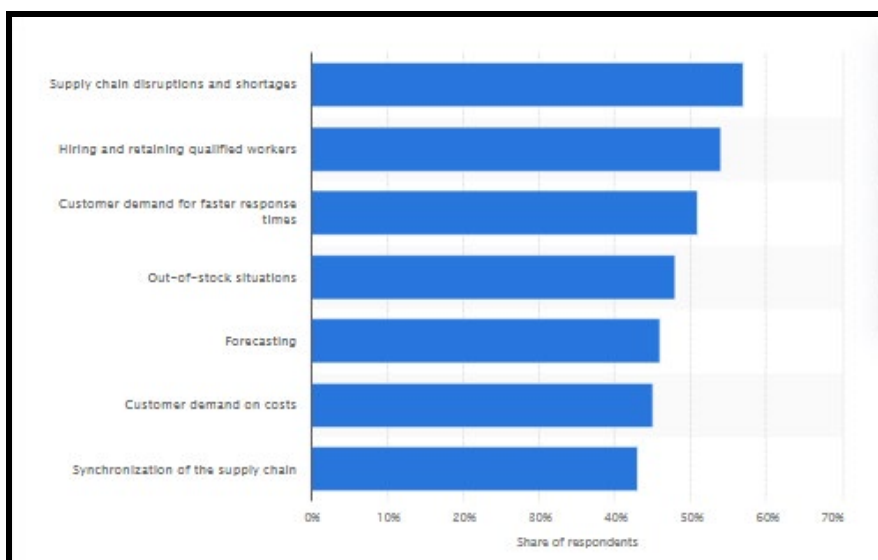
Figure 1.2: Supply chain challenges faced by the companies

(Source: Statista. com, 2022)

The above-mentioned figure has shown the problems that arise in the retailing company after the assumption of the enormous data screening processes. The principal problem that faces big data analysis is Supply chain disruptions and shortage, which causes a huge amount of data loss for the company (Aryal *et al*. 2018). Sometimes the big data screening process fails to store the enormous amount of essential data of the customer, which creates a problem for the company, and the company breakdown the demand of the customer. The supplying company sometimes failed to give a response to the customer timely. [Refer appendix 1]

The business retailer company sometimes runs into the out of stock situations because the technology fails to give the correct update about the stored data. As suggested by Brinch *et al.* (2018), the data execution process of the massive amount of data is vital for the company as it stores the suppliers' updates and collects the customers' order details. The company processes all the collected data and gets to know about the development of the products and meet the customer demand. Sometime the retailing company has faced in the forecasting process. The company needs to access the forecasting data to managers the delivery processes on time.

1.4 Research aims and objectives

The aim of this research study is ***"To identify the impact of big data execution processes on the "Supply chain management" of the retailing companies.***

The researcher has gone through many processes to determine the principal aim and the key objectives of this research approach. The key objectives are as follows-

RO1. To identify the significant role of the big data execution process in "supply chain management".

RO2. To analyze the factors that are connected with the enormous data execution processes in the "supply chain management."

RO3. To identify the challenges faced by the "big data analytic process" for developing "supply chain management".

RO4. To identify the related methods for the research findings to mitigate the challenges faced during the analysis of the big data.

1.5 Research questions

The researcher has created some research questions, which are in alliance with the research objectives for developing the pieces of knowledge about this research study and easily maintaining all the research perspectives. The research questions are as follows-

RQ1. What is the significant role of big data analytics in executive the supply chain process fluently?

RQ2. What are the factors that are connected with the enormous data execution processes in "supply chain management"?

RQ3. What are the challenges faced during the analyzing process of the huge data in the supply chain execution?

RQ4. What methods are used by the researcher to mitigate those challenges of the big data analysis process in "Supply chain management"?

1.6 Research Significance

This research study is very crucial to determine the effects of the big data screening process in the supply chain managing process. Determining the huge amount of data for managing the supply chain in the retailing business plays a significant role. As suggested by Benzidia *et al.* (2021), this approach addresses all the critical factors that are countered by the companies during the processing of the big data in the supply chain execution. Frequently the company has faced the loss of huge amounts of data due to the lack of proper technical work. These research findings have helped the companies to determine the factors for reducing these issues and increasing the development of productivity. Maximum time the retail companies have to store the past data along with the present working details and other data. Therefore, this causes a huge mess up of the gathered data (Raman *et al.* 2018). Hence, this research has helped the industrial and retailing companies to find out the appropriate information to mitigate the problems related to the stored data and determines those.

The researcher has collected much information by focusing on the problems faced by the companies. The findings help the researcher to illustrate the collected information and manage the significant factors of this research approach. As viewed by Singh and El-Kassar (2019), the companies sometimes face problems related to the synchronizing process of the collected data. Therefore, this research approach to the impact of the huge data processing in the supply chain execution helps the companies to decrease these problems and recreate the development process.

1.7 Rationale

The researcher has discussed the research rationale during this study to optimize the importance of the extensive data analysis process in the supply chain execution. The researcher has chosen many aspects to determine the benefits of these research findings and their impact on the supply chain execution to enhance productivity growth. Bag *et al*. (2020) opined that the extensive data analysis process is a practical operational approach that enhances the sustainability of supply chain management.
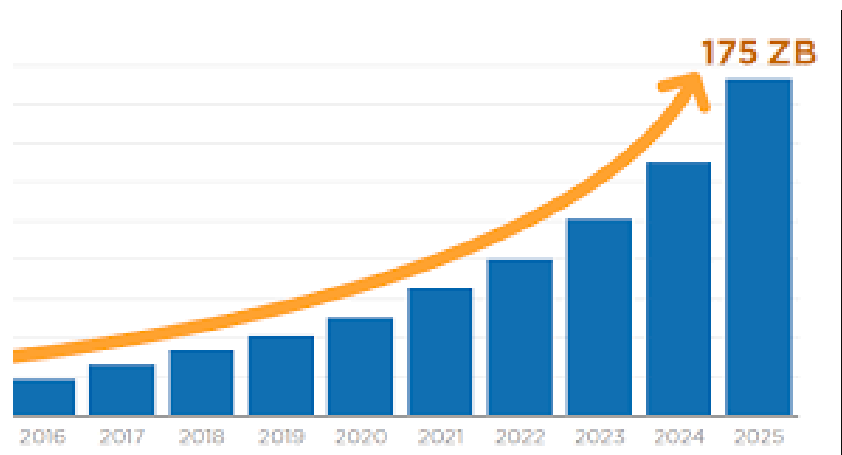
Figure 1.3: impact of Big Data Analysis on the growth of Supply chain management

(Source: Gstatic, 2021)

 This approach helps all the organizations to get the appropriate information about the customer and store all the data of the customer to process maximum productivity. The retailing companies follow digital marketing nowadays. During digital marketing, the companies have to store all the customized data and process them for executing the marketing programmed on the social media platform (Arunachalam *et al*. 2018). Therefore extensive data analysis process is helpful for all the retailing companies to maintain this marketing programmed and enhance the digital marketing process. The advanced information technology helps store the entire customer's ordering details and the data set of the personal information. The company works by analyzing those enormous amounts of data and processes them to get progressive results.

1.8 Dissertation Structure


```
Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research methodology

Chapter 4: Research findings

Chapter 5: Discussion of the research findings

Chapter 6: Conclusion and Recommendation
```
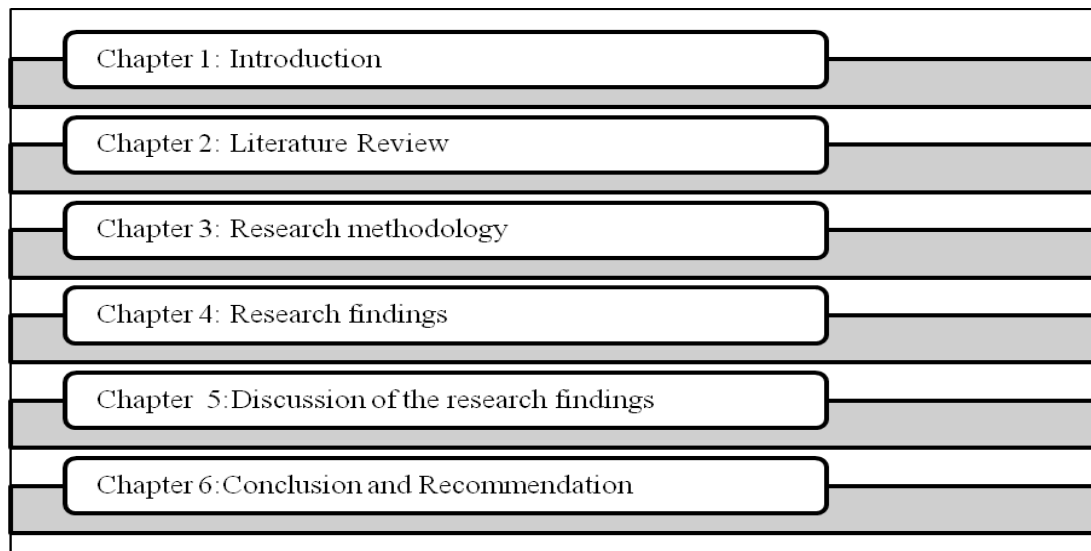
Figure 1.3: Dissertation structure

(Source: learner)

The researcher has provided a dissertation structure in this chapter. According to this structure, the researcher has followed many steps to complete this research study. The above figure 1.3 has discussed the dissertation structure has demonstrated all the critical study topics that enhance the quality of this research study. This informative structure has included chapter 1, which has illustrated the introduction of this research study. This introduction part has discussed the research background and the aims and objectives. Chapter 2 in this dissertation explains the literature review part, where the researcher has critically examined the important factors. According to the dissertation structure, chapter 3 has examined the research methodology. Chapter 4 analyses the research findings where the researcher determines the collected data and demonstrates the findings. According to the dissertation structure, chapter 5 has discussed the overall discussion of the research findings. Chapter 6 has explained the conclusion and recommendations after completing the research findings.

Chapter 2: Literature Review

2.1 Critically discussing the Concept of big data analytics

Big data analytic data integrates past vending trends with anticipating technology. Big data analytics guides how much to look for the inventory managers. As viewed by Chehbi-Gamoura *et al*. (2020), big data analytics helps to manage the financial problem of organizations. Big data allows organizations to cut prices significantly. Therefore, they can order enough products to supply the consumers. In contrast, Govindan *et al.* (2018) suggested that big data analytics maintain too much ordering of the supplies and manage the organizations from wasting the products. The big analytics data helps the organization, it can help in the enhancement of the business performance and lead the organizations towards a better future. Hence, the author critiqued those big data analytics in helps to determine how much product can be ordered for selling.

It also helps the organizations to analyze how much can be kept down when the products become not so much as profitable Aryal *et al*. (2018). Big data analytics helps the company to understand the customers' demands. Big data analytics is performed on information technology and manages the available pieces of information of the organizations and the consumers. Advanced information technology helps the organization manage the data and analyze them statistically.
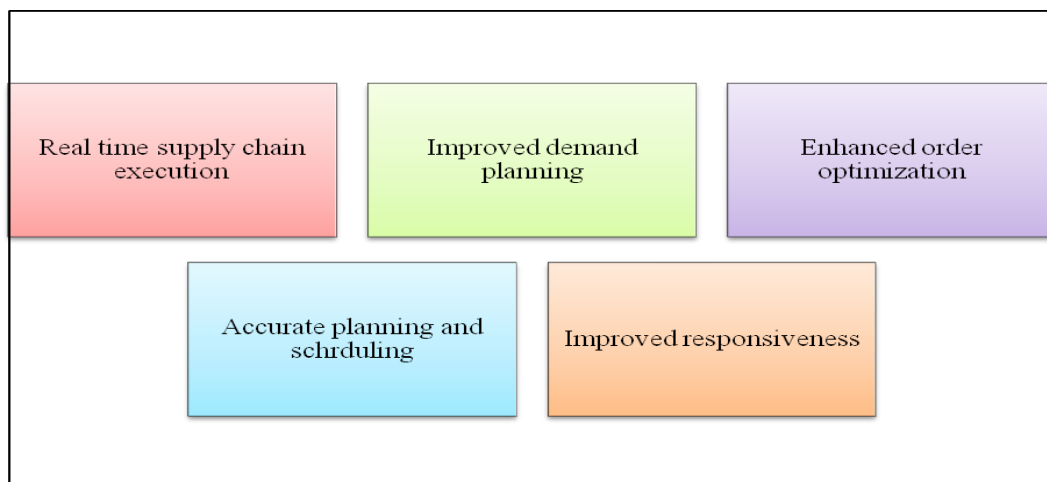
Figure 2.1: Big data analytics

(Source: Aryal *et al*. 2018)

Big data analytics plays a key role in the improvement of. Big data analytics impacts by reducing cost-efficiency. As viewed by Seyedan and Mafakheri (2020), stated that big data analytics is a real-time supply chain execution. It helps to manage the routes for faster delivery and reduce the communication gap among the employees and the consumers. Big data analytics improved the organization's demand planning by managing the consumer's data. This data analytic process helps the organization to enhance order optimization that in turn increases the financial growth. In contrast, Nguyen *et al*. (2018) commented that big data analytics manage to plan accurately and reschedule the plans for better execution.

Big data analytics is helps to improve the responsiveness to enhance the consumer's growth that helps the company for increasing its business performance. Hence the author argued that big data analytics improves data-driven decision making, which in turn reduces the cost-effectiveness and enhances the economy of the organization Del Giudice *et al*. (2020). "Supply chain management," allows big data analytics to manage ordering supplies and enhance the service of the organizations. Big data analytics improves inventory management and enhances the productivity of organizations. Big data analytics helps organizations meet the customer's demands and to satisfy them by providing them with product approaches. Big data analytics manage the company's data to get the correct information about the customer that helps the company to improve in future. Big data analytics helps the company to revenue in various countries with the brand reputation and helps to spread the business for better financial growth.

2.2 Role of "big analytics" data on "supply chain management"

Big data analytics plays significant role in the organization managing the data and increasing the business performance. As suggested by Raman *et al.* (2018), big data analytics reduces the production cost and increases the inventory management of the organizations. In this research topic, the researcher has discussed the role of big data analytics in. The looks after the productivity and the supplies order in the organization. In contrast, Brinch *et al.* (2018), incited those big data analytics determine the stored data of supplies, customers, and financial growth. This stored, analyzed data helps the organization in future to determine the requirements of the company for the business enhancement. Therefore, it is essential for any organization to carry out the big data analytics to manage the supply chain of the organization. The demand data consist of the forecasting of the demands that helps to identify the demand of the customers using the sales record. This helps in the improvement in the

business processes in improving the quality of the products and meeting the demands of the customers. This helps the business in advanced planning regarding the total sales allocated for the future.
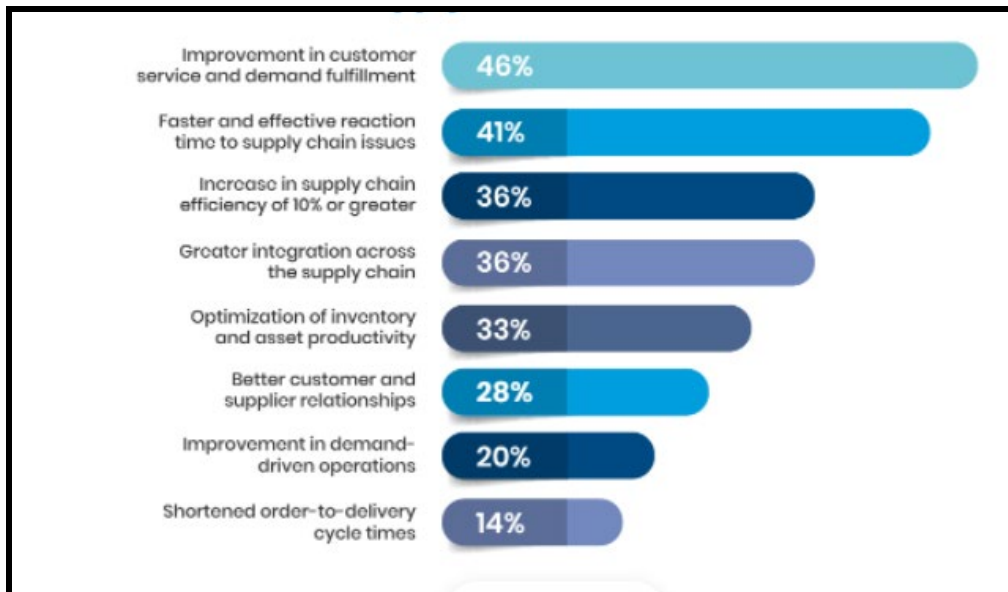
Figure 2.2: Benefits of the big data analytics in the "supply chain management'

(Source: Brinch *et al.* 2018)

The above graph showed that big data analytics is beneficial for "Supply chain management". It helps in the improvement of customer service to fulfill the customers' demands. The above graph showed that 46% of the improvement in the customer services by following the big data analytics for maintaining the "Supply chain management". In the above figure, 41% of the faster and more effective reaction times to supply chain issues improve by the big data analytics of the organizations. Therefore, big data analytics manages the time for the speedy delivery and provides an effective reaction for the "Supply chain management" (Bag *et al.* 2020). Big data analytics helps in the supply chain efficiency of 10% or greater. The above figure showed that big data analytics 36% of the improvement in the supply chain efficiency. A study on the "Face book" social media managing company determining that this company also get benefited by the data analyzing process. Big data analytics has greater integration across "Supply chain management". From the above figure, it is shown that 36% of the integration becomes effective through the big data analytics process. *[Refer to appendix 2]*

Big data analytics helps in the optimization of inventory and asset productivity. The above-mentioned figure explained that 33% of the optimization of inventory happens through big data analytics that asset the productivity and manages the business performance. Big data

17

analytics improves the better customer and supplier relationships. In contrast, Arunachalam *et al.* (2018) opined those big data analytics helps in the determination of the consumer's stored data and analyzes the company's productivity through the data analyzing process. Big data analytics helps to improve demand-driven operations and manages to make authentic data-driven decisions for business performance. The above-mentioned figure showed that 20% of the improvement has happened by following the benefits of the big data analytics process in "Supply chain management". "Big data analytics" helps to shorten the delivery times after processing the order. Hence the author stated that "big data analytics" helps the organization approach the correct route for the employees to complete the orders on time (Hazen *et al.* 2018). Therefore, big data analytics improves the organizations' supply chain and improves the delivery time, which enhances customer satisfaction.

2.3 Critically analyzing factors related to "big data analytics"

Many key factors are related to "big data analytics". Such factors are- "Storage factor", "Processing factor", "Security factor", and "Quality factor'. These factors are independent variables of "Supply chain management". As suggested by Awwad *et al.* (2018), "Supply chain management" influence "big data analytics" for maintaining the supply chain and the operational services of organizations. The factors related to "big data analytics" affect organizational growth and enhance business performance. In contrast, Anitha and Patil (2018) opined that the factors affecting "big data analytics" help the organizations with the exponential development of the products supplies. As an example, an international company "Amazon" is using this big data analytics process for improving their business.
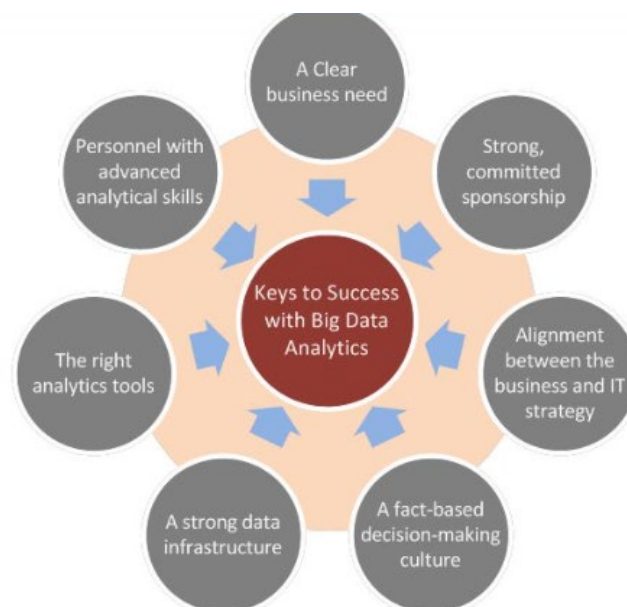
Figure 2.2: Principal success factor of big data analytics

(Source: Awwad *et al.* 2018)

The company needs to align the goals with the strategy to develop the "big data analytics" for the company's growth. Ball, the company, requires setting the goals for achieving the future development over the organization's productivity (Chehbi-Gamoura *et al.* 2020). Organizations need to develop the necessary skills to manage the "big data analytics" that helps to maintain the supply chain for increase the business performance. "Big data analytics" plays a beneficial role in the organization for developing the products and maintaining the organization's "Supply chain management". As opined by Govindan *et al.* (2018), there are four aspects and principles to consider the big data, which are "Volume", "Velocity", "variety", and "veracity". The volume makes the data huge for analyzing the overall significance of the production. A huge amount of data is made every year in the organization, which helps in the rapid growth. The company must handle huge data for this "big data analytics" process to help the organization from the messed up and protect the data. It also helps the organization with the seamless structure of the stored data.

According to these factors, the company needs to concentrate on the ethics of the organization and follow up the governmental regulations for successful growth. Ethics help "Big data analytics" to provide legal improvement to the organization (Aryal *et al.* 2018). These ethical "Big data analytics" protect the "supply chain management' from any hazards and deployment in the delivery. In contrast, Seyedan and Mafakheri (2020), suggested that factors of "Big data analytics" help in the making of analytics that help proceed with business performance. However, organized data is easy to analyze as it follows the Concept of "Big data analytics", and it helps the organization with searchable variations. As mentioned by Khoreva and Wechtler, (2020), the transparency and the strategy influenced the "Big data analytics" that affects the "supply chain management' of the organizations. Hence, the author critically stated that veracity affects the factors of "Big data analytics". The stored data need to be accurate and trustworthy for the organization. The accurate data reduces the erroneous of processing the productivity of the organizations (Nguyen *et al.* 2018). The researcher has discussed the factors related to "Big data analytics" for the completion of the research study. A reputed multinational company "Apple" is using these factors for increasing their businesses.

2.4 Critically discuss the relationship between "Big data analytics" and effective supply chain management

The researcher has discussed the relationship between "Big data analytics" and effective "supply chain management' critically. In this chapter, the research study has explained that "supply chain management' allows "Big data analytics" for the successful growth of the business and to enhance economic growth. As suggested by Del Giudice *et al.* (2020), "Big data analytics" is important for "supply chain management' to discuss inventory management. It helps to keep the stirred and collected data clean and appropriate for the implementation of productivity in the organization.

Figure 2.3: Relationship between "Big data analytics" and "supply chain management'

(Source: Del Giudice *et al.* 2020)

"Big data analytics" maintain the inventory management of the organizations. Inventory management controls the overall productivity of the organizations and helps to increase business performance. In contrast, Raman *et al.* (2018), "Big data analytics" maintain the unorganized data and process those data for successful decision making to enhance economic growth. As per the view of Anitha (2018), Supply chain analytics manages the warehousing to enhance employee engagement and reducing unnecessary work that may delay the productivity and order procedures. The Big data analytics of the supply chain management makes the data processing easier and more valuable for the organizations.

Therefore, the "Big data analytics" process enhances the storage efficiency of the warehouses. "Big data analytics" manages the improper and invariable data that affects the productivity of the company (Brinch *et al.* 2018). Big data optimize the automatically collected data and images that make insight into the accuracy and the validation of the warehouses' performances. "Big data analytics" manages the logistics of the warehouse

productivity and maintains the data of the delivery procedure from the warehouse to the door of the customers. "Big data analytics" processes manage the supply chain strategy of the organization to execute the supply ordering plans. In contrast, Bag *et al.* (2020) opined that "Big data analytics" carries on the supply chain planning for the growth of the business performance that impacts the productivity of the organizations.

"Big data analytics" manages the supply chain enterprises and makes the supply-chain management applications easier for the organizations. Therefore "Big data analytics" helps the organizations to be enhanced the profits over the production and improve the business performance (Arunachalam *et al.* 2018). As an example, the supply chain analytics meets the "supply chain management" for improving the manufacturing process of the major organizations named "Google". In contrast to Charmaz and Thornberg (2021), the "Big data analytics" process acts on the information technology that may help the supply chain analytics to gather information about the operation service and increase the productivity smoothly. The data analytics process helps in the improvement of the safety of the employees by searching past information about them. As viewed by Hazen *et al.* (2018), Supply chain analytics helps the organization predict the manufacturing interruption of the organization. "Big data analytics" acts on the "supply chain management' and helps organizations track the transport in real-time.

The operational management plays a great significance role in identifying all the processes that slow down the operations in an organization. In contrast to Khoreva and Wechtler, (2020), the operations include technical operations, delivery operations and strategic operations. The sales management, logistics management and the strategies management also include in the operations of the analytic processes.

2.5 Theoretical underpinnings

The researcher has followed some theoretical aspects to study the research topic and to collect the information about the "Big data analytics" for the "supply chain management' and the operation services. The researcher discussed "Agency theory", "Transaction cost analysis theory", and "grounded theory". This theory has helped the researcher in the completion of the research topic.

2.5.1 Agency   theory

Agency theory is referred to determining the relationship between the representative and the primary. The representative analyses the primary aspects of a particular organization in the

transaction and expects to focus on the best interest of the primary aspects without regard of own interest.
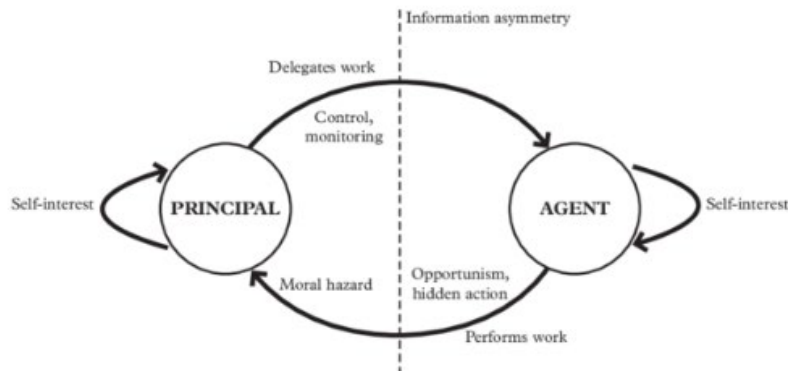
Figure 2.4: Agency Theory

(Source: Charmaz and Thornberg, 2021)

This theory addressed that "Big data analytics" helps to improve stakeholder affluence. According to this theory, the company manages the "Big data analytics" to attract the retailer and the stakeholders for the business growth. As viewed by Khoreva and Wechtler, (2020) the agency theory helps the organization target the improvement of the economical wealth. The "Big data analytics" process influenced the employees and the inventory manager to enhance the business and increase the productivity of the organization. In contrast, Safriliana *et al.* (2018) opined that the organization follows the theory to motivate the working employees and to improve the information technology system to maintain the business performance.

2.5.2 Transaction cost analysis theory

The researcher has followed the transaction cost analysis theory to determine the "Big data analytics" for the "supply chain management' and the operational service. Transaction cost analysis theory included some key factors. "Bounded rationality" and "opportunism" are aligned with the "Factors impacting cost". The factors affecting cost analysis rely on the "Degree of impact on costs". The degrees that affect the cost are aligned with the "Frequency", "Uncertainty", and "Asset specificity". As viewed by Shahab and Viallon (2019) the translation cost analysis theory helps the organization to determine the "Big data analytics" for the "supply chain management'.
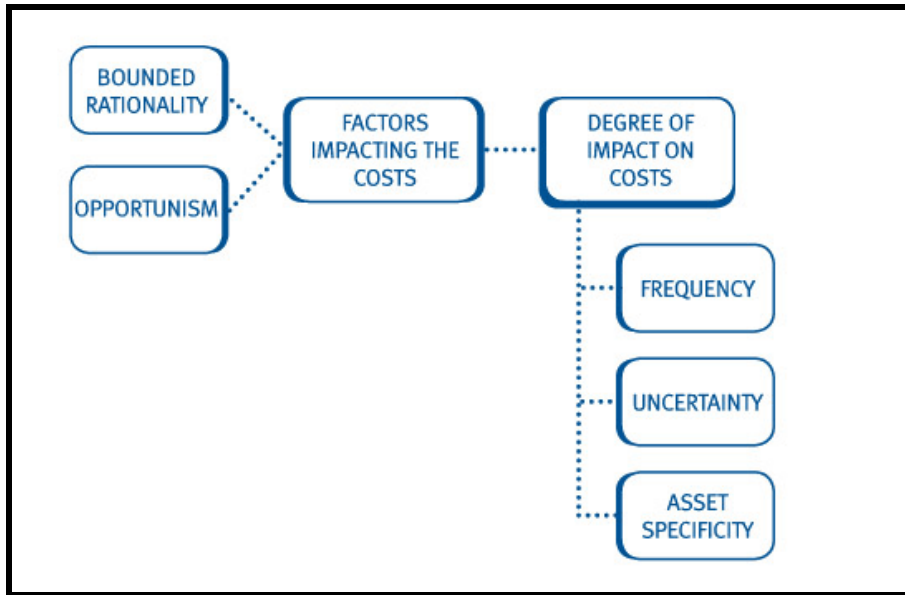
Figure 2.5: Transaction cost analysis theory

(Source: Shahab and Viallon, 2019)

This theory addressed that the organization must bound the rationality and the opportunism for influencing the factors that impact the transaction cost of the organization. In contrast, Rindfleisch (2020) opined that the degree the impact the transaction cost analysis has played a key role in maintaining the "Big data analytics" of the "supply chain management'.

2.5.3 Grounded theory

In this chapter, the researcher has discussed the "Grounded theory" to get the correct pieces of information about the research topic. "The Grounded theory" is a comparative method that enables the researcher to look after characteristics to analyze the new theories that are aligned with the collection of the data and helps the researcher to analyze the real approaches to the research topic. As viewed by Charmaz and Thornberg (2021), the "grounded theory" is included with experiments, secondary data, interviews with mediums and sitters, case studies and focus groups. The organization follows this theory to analyze the big data to manage the supply chain and maintain the operational services.
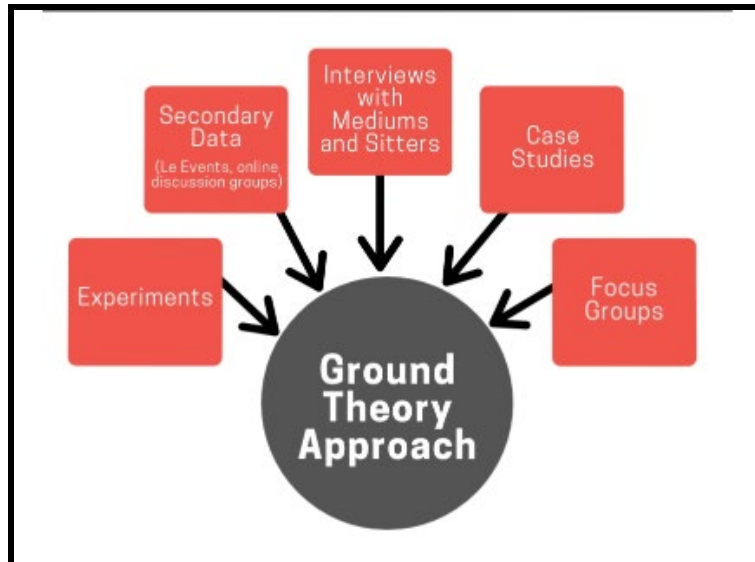
Figure 2.6: "Grounded Theory"

(Source: Charmaz and Thornberg 2021)

According to the grounded theory, the organizations follow some step to complete the productivity and develop the business performance. The theory allows the organizations to organize the data around the Concept for the clarification of the collected data of the consumers. Hence, the author critiqued that to process the data analytics for the "supply chain management' the organization need to form the categories of the related concepts for an improvement in "supply chain management' (Lambert, 2019). The organization need to elaborate patterns and link those data between the categories. By following this theory, the organization can develop a theoretical explanatory model for influencing the data analytics process of the "supply chain management'.

2.6 Literature Gap

The researcher has discussed the Concept of "Big data analytics" and the role of "Big data analytics" on "supply chain management'. In this chapter, the researcher critically analyzed the relationship between "Big data analytics" and "supply chain management'. As suggested by Tiwari *et al*. (2018) lack of properly skilled employees and proper knowledge about information technology decrease the data analytics process in the "supply chain management". The literature review part did not show the appropriate managerial strategies of the data analytic process for improving "supply chain management'. Hence, the author analyzed the lack of proper resources diminishing the data analytic process for managing the "supply chain management' (Maheshwari *et al.* 2021). This part did not explain the process

how to reduce the challenges faced by the big data analytic process in "supply chain management'.

2.7 Conclusion

This chapter concluded the conception of "Big data analytics" and explained the role of "Big data analytics" in "supply chain management'. In this chapter, the researcher concluded the relationship between "supply chain management' and the "Big data analytics" process. This chapter also discussed the theories to determine the impact of "Big data analytics" on "supply chain management'.

Chapter 3: Research Methodology

3.1 Introduction

The study has discussed the analytic data techniques in the business organization for progress in the business. This study also the essential factors of the business's supply chain management. The methodology section gives the information regarding the method, which is used to detect the quantitative information regarding the research. The primary method used in this fundamental research is to analyze the details information.

3.2 Methodology outline:

The methodology outline is necessary to demonstrate the overall aspect of this research work on "supply chain management". Here it discussed the research philosophy, approach, design, strategy, data collection method and analysis to reflect the total work performance of this research study work.

Aspect	Significance
Research philosophy	Positivism
Research design	Descriptive
research approach	Deductive
Research method or strategy	Primary
Data collection process	Survey
Data analysis	The primary data analysis process

Table 3.1: Methodology outline

(Source: Learner)

The above Table 1 shows the aspect and significance of this research study and discloses its procedure and purpose for analyzing the impact of "big data analysis" On "supply chain management ".

3.3 Research Philosophy

Positivism

Positivism research philosophy has been followed for doing this research in the present times. As per the view of (), the business organization get direction for moving step for the progress of the project. The advantages of this notion help to provide authentic and scientific information to analyze the effectiveness of "big data" analysis on "supply chain management". This also provides up-to-date information and helps this research work to find scientific evidence on this relevant topic (Kumar, 2021). This chosen philosophy helps the research work to find out the hypothesis that provides a qualitative and authentic result on this relevant topic.
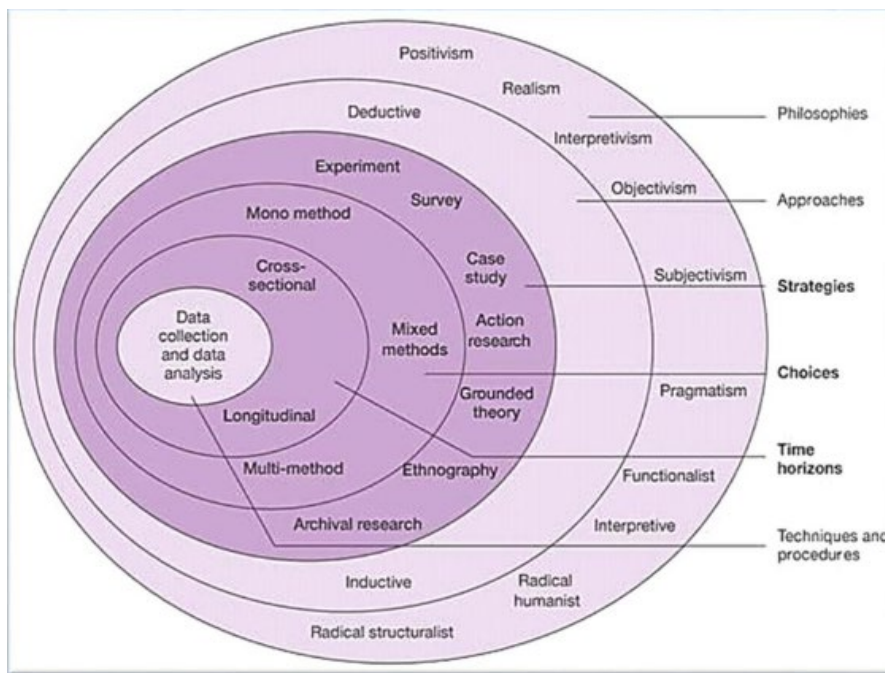
Figure 3.1: Positivism philosophy

(Source: Saunder *et al.* 2021)

Positivism research philosophy is giving a significant impact on the overall research study. Enhancing the business organization's financial condition is any business's primary motive. "Big data analysis" is helpful to detect the strength and weaknesses of the company in the modern time in the business sector. This research study is relevant to the current business situation. "***Positivism research philosophy"*** helps this research study to get direction for conducting the research. This research philosophy is uses for scientific research, and this study is also connected with the innovation in the business field; therefore, positivism philosophy is suitable here.

3.4 Research Design

Descriptive

A descriptive research design had used in this separate research study. As per the view of (), data in the research are coming in a systematic process which is essential for the progression of this research study. This research study is relevant to the present business situation. The elaboration is essential in the business and is required for the progression in the business.

Characteristics of the research variables are determined through the research variables. As per the view of Kumar (2021), variables in the research are having a significant impact on the research study.

Advanced technological devices are used in modern business to expand the business on the international platform. The decision-making process was giving benefits from this data analysis process. Business companies face many issues in expanding the business worldwide; for this reason, internal and external stakes holders are scrutinizing every matter with close observation of the outcomes of the data analysis process. Descriptive research design is helpful in this overall research and the guidelines of this research are based on this design of descriptive research design.

The descriptive research design applies to the scientific research study. As per the view of Nguyen (2018), information comes with implementing a "descriptive research design" based on changing environment in the current business situation. Many techniques are used to determine the positive and negative factors in the current business companies; for this reason, this research design is helpful in this study to determine the operation method used for analysis purposes.

Supply chain management is an essential factor in the business field. According to Hazen and Skipper (2018), delivery products to the customers through the supply chain management. This research study has analyzed the essential factors of the method of the data analysis process and described the value of supply chain management for business.

3.5 Research approach

Deductive research approach is perfect for this study. Consequently, this research applied a deductive research approach to get creative information for the topic of the research. As per the view of Kumar *et al.* (2021), the deductive research approach is applied to scientific research. This research study also analyzes the problematic factor, which is affecting the supply chain process in the business organization. Various techniques are used in the data

analysis process, which is applied in the analysis process for the progress of the business organizations.

The risk management process totally relies on the factors coming from the data analysis process, which occurs in the modern time in the business organization. As per the view of Flick *et al.* (2021), the data and analysis process have a significant impact on the success process.

Deductive research has positively influenced the overall research study, which is effective for this research study. The critical thinking process is getting benefits from this deductive research approach. As commented by Govindan and Cheng (2018), decision taking in the risk management process is based on the critical thinking ability of the employees. This "deductive research approach" enhances the quality of decision making which is essential in the present world (Ziem and Flick, 2019). This "research approach" has helped this research study. Updated data for this research study has been evaluated via this approach in the study.

3.6 Research Method or Strategy

The Primary research method is implemented in this research, which has a positive impact on the overall study. As mentioned by Govindan and Cheng (2018), scientific information is coming for various research that are fruitful for enhancing the process of research. Fifty-one common people in the United Kingdom have participated in the survey, and the belief of the people helped this research to analyze the important facts about the whole research.

The primary research method has a giving a significant positive effect on the progression of this research study. The workload of the employees is reduced by the implementation of technology in the working sector. Technological applications are providing benefits to the employees as well as the whole organization, which is effective for the growth of the organization. Modern technology is also helpful for the data analysis process in modern times.

This research study is based on the evaluation of processes, which significantly influence the success of business in modern times. As per the view of Bag and Wood (2020), the primary method in the research gives quantitative information for various kinds of research. Quantitative information is vital to get authentic information regarding any research study. This research study has given positive results to modern business companies achieving business goals. This "primary research method" gives specific plans to the organization for dealing with the challenges of the increasing threat in the business (Zhao and Shang, 2019).

This method gives the proper approach to conducting this research to benefit the b business sector. Fifty-one participated in the survey conducted for this research and gave all the answers to fifteen questions regarding this research study.

3.7 Data collection process

The primary data collection process is used for gathering the data for analysis of the important factor regarding the research study. As per the view of Schwartz (2021), data collection in the primary process directly from common people has a remarkable effect on the success of business companies in crucial times. As per the view of Flick (2021), the research method is completely dependent upon the data; therefore, collection process has been implemented with critical thinking. A survey has been conducted for this research in which fifty-one participants are given valuable opinions of them regarding the research topic.

The primary data collection method gave an effective result in this research study, which is positive for the research study. As per the view of Roßmann and Canzaniello (2018), data is collected from the source in this primary data collection process, which is essential to the success of the particular purpose of the research. The financial cost of using this primary data collection process is lower compared to any other process, which is favorable for any kind of research study. According to Arunachalam and Kumar (2018), the opinion of the people directly comes in the form of data in the primary data collection process. Application of technology is the business purpose is essential for the achievement of the various business targets in the present time.

3.7.1 Population

In the survey process, which is applied for this research study, there fifty participants were putting their opinion about the results of big data analytics. Here the population size is fifty-one.

3.7.2 Sample size

Fifty-one participants had answered the fifteen survey questions regarding the research, which is based on the outcomes of the "big data analysis" in the business sector. Fifteen surveys question is the sample size of this overall research study.

3.8 Data analysis

Primary data analysis process has been used to evaluate the details information about the method used in the data analysis process in the modern business organization. The scientific

data analysis process is required in this type of innovative research. The quantitative data is determined by the mechanism of primary data analysis. Application of technology in the business field gives fruitful conditions to get sustainability in business.

The primary data analysis process is effective for the growth of the modern business. As per the view of Brinch and Stentoft (2018), the authenticity level in the "primary data analysis process" is relatively high, which is required in the present time. This research study has succeeded in its mission for the "authentic" data collected by this process. Another advantage of this "primary data analysis" process is that "specific information" comes out through the application of this process in the method used in the detailed research. "Primary data analysis process" is the first choice of the business organization for evaluating the essential information regarding important matter in business.

3.9 Reliability and validity

Reliability and validity tests are vital for the detection of the degree of the research and determine the level of error in the research.

The accuracy of the collected data and analysis process is determined through the validity test in the research. Consistency of the research method is detected via a reliability test. As per the view of Kumar (2021), "reliability" and "validity" both the test are important for the research methodology. The accurate data is vital to analysis the details information regarding the research and the "reliability test" and "validity" tests are playing effective role for the accuracy measurement of the collected data and determine the degree of the research study.

3.10 Ethical Considerations

Data protection act

Big data analysis is essential in modern times in the business sector. The research study followed the data protection act to get success in this research. As per the view of Markowitz (2021), business authorities must follow the protection act regarding the data for running any kind of research without any disruption.

University guidelines

This research study maintains all the guidelines provided by the university in the United Kingdom, which gave an effective result in the overall research. According to Tackett (2021), instruction of the university is effective for any kind of creative research.

Malware practice

This study has not followed any kinds of illegal activities for completing the target of this research. Malware practices are an illegal activity, which is applied by criminals for doing any crime (Yanofsky, 2021). This research study has not connected with any malware practices, which gives a positive result in the whole research.

Fraudulent activities

This study did not apply any "fraudulent activities" to the progression of the business. "Data analysis" is the trending term in the modern business world.

3.12 Summary

This research study gives innovative information regarding the effect of "big data analytics" on current business companies. The primary research method gives quantitative data regarding the important factors of "big data analysis". Business organizations face many challenges for various problems for this reason data analysis method is effective in knowing the facts and making strategies to resolve the issue to an extent level.

Chapter 4: Data findings and analysis

4.1 Introduction

The researcher has selected the primary data collection process for analyzing this research study. During this study, the researcher found several relevant data regarding this research topic. This chapter is going to analyze the findings that are collected by the survey process. This chapter includes the demographic analysis and the analysis of the variable's questions for the implementation of "Big data analytics" in supply chain management.

4.2 Findings of the collected Primary data

The researcher has selected the population for collecting the topic relevant data. The researcher distributed some demographic questions and some variables questions to the respondents, and they willingly participated in this survey and gave some significant responses and their opinions about "Big data analytics" and "supply chain management".

4.2.1 Demographic analysis

4.2.1.1 Age

The figure 4.1 shows the pie chart that is designed from the given responses from the respondents. According to the above-mentioned figure during the research, various aged persons took participated and gave their opinions about the research topic (Aryal *et al.* 2018). During this study, 25.5% of 18-25 aged young participants kept their various opinions. On the other hand, 29.4% of the people were between the ages of 25-35 who also gave their responses about the implementation of "Big data analytics" in organizations.

In this survey, 15.7% of the people were between 45-60 years of age and were willing to participate in the survey to give their comprehension of the research topic. Therefore, it can be stated that age is important for analyzing the research study. As suggested by Chehbi-Gamoura *et al.* (2020), various aged people give various answers that make the researcher determine the approximate values of the findings. Therefore, the findings provide different information about the research approaches. From these research findings, it can be determined that participation of all age groups makes this research study more successful and authentic. ***[Refer to appendix 6]***

4.2.1.2 Gender

The figure, 4.2, visualizes the pie chart that shows the percentage of the respondents who were the participants in this research study. As suggested by Seyedan and Mafakheri (2020), the significance of gender has given the importance of the research study. According to the above-mentioned figure, 42% of males were willing to participate in this research study to provide their various opinions about "Big data analytics" and "supply chain management". On the other hand, 40% of females actively participated in this research study. Therefore, it can be stated that nowadays males and females are in the same position and have the same potential to progress in any work (Oncioiu *et al.* 2019). In this research study, 18.5% of people were other participants who belong to the transgender section. From this research study, it can be stated that various gender has the same chances and potential to participate in all kinds of social and organizational activity by avoiding gender discrimination. *[Refer to appendix 6]*

4.2.2 Analysis of variable questions on the implementation of "Big data analytics"

4.2.2.1 Data analysis potentially contributes a positive effect on the Business improvement

The figure 4.3, displays the pie chart that includes the various opinions of the respondents about the effect of data analytics on business improvement. The researcher asked about the potential of data analytics and its contribution to business improvement. In this research study, 29.4% of people agreed about the positive effect of the data analysis process on organizations, while 15.7% of people strongly agreed with the question that has been asked to the selected populations. As viewed by Tiwari *et al.* (2018), the data analysis process has an enormous number of positive approaches that contributed to its effect potentially. According to the above pie chart, 21.6% of people disagreed with this question, they believed that big data analytics has no positive effect on organizational improvement. On the other hand, 25.5% of people were neutral over the questions asked. Therefore, it can be stated that the data analysis process helps organizations to develop their business. *[Refer to appendix 6]*

4.2.2.2 Present condition of supply chain management

According to the *figure 4.4,* the researcher asked questions about the present conditions of the data analysis that has created adversities in the "supply chain execution" for developing the business performances in the organizations. In this survey, 31.4% of people strongly

agreed that the present situation has formed adversities in the supply chain execution system. On the other hand, 21.6% of people agreed with the provided research questions. As suggested by Maheshwari *et al.* (2021) the adversities in the supply chain execution diminish the business improvement and decrease the economic benefits. In this survey, 17.6% of people disagreed with the question that discussed the adversities of "Supply chain management" and the impact of "Big data analytics". In this research study, 21.6% of people were neutral about the discussed questions. Therefore, it can be stated that according to the present situation "supply chain management" has faced adversities that can be decreased by the implementation of the "Big data analytics" process (Nguyen *et al.* 2018). ***[Refer to appendix 6]***

4.2.2.3 Positive contribution of the data analysis process in supply chain management

In the provided figure 4.5, it is shown that 31.4% of people strongly agreed about the positive contribution of big data in ***the above-mentioned figure 4.5***a analytics on "Supply chain management". As suggested by Jha *et al.* (2020), data analytics process has played a significant role in organizational improvement. According to the above figure, 25.5% of people agreed with the given question that described the positive effect of the data analyzing approaches to enhance job performance. On the other hand, 21.6% of people disagreed with these facts and they did not believe that the big data analytics process has positively affected the supply chain execution process to influence business development. From this research study, it has been stated that in this present era organizations need to improve the data analysis process to increase business approaches globally (Brinch *et al.* 2018). This process can increase the vast pieces of knowledge among the employees to maintain and increase the commercial benefits of the organization. ***[Refer to appendix 6]***

4.2.2.4 Impact of data analysis on organizational operations

The figure 4.6 reflects the impact of data analysis on the organizational operation that affects the "Supply chain management process". This image shows that about 27.5% of the survey participants strongly agreed to accept the positive impact of "data analysis" to enhance organizational performance while 25.5% of the members formally agreed with this statement. As mentioned by Bag *et al.* (2020), the implementation of the "data analysis" process helps to increase the growth of firm operations. However, about 9.8% of the involved participants strongly disagreed with the importance of the "data analysis" process in the development of

firms' operations. The successful usage of the "data analysis" process helps to catalyze the business performance and monitor its activities to assist the top place in the competitive market (Liu *et al.* 2020). Therefore, about 17.6% of the members show their disagreement with this proposed statement while 19.6% of the members remain neutral. ***[Refer to appendix 6]***

4.2.2.5 Improvement of the decision-making process in several organizations

The figure 4.7 displays different kinds of factors in the data analysis process that helps in the improvement of the decision-making process. As suggested by Talwar *et al.* (2021), many factors positively affect the data analysis process to increase business development. According to the above graph, 25.5% of people believe that the adoption of modern technologies in the organization improves the data analysis process that enhances the supply chain management by improving the decision-making process. On the other hand, 27.5% of people showed their interest in the option that was about increasing technological skills among the employees. Therefore, it can be stated that the organization needs to improve the technical skill among the employees to develop organizational growth Fosso (Wamba *et al.* 2018). This also helps the organization to enhance employee engagement in the organizational sector. In this survey, 25.5% of people said that enhancing the data processing services in the organizations can improve the decision-making process for increasing commercial benefits and maintaining the organizational reputations. ***[Refer to appendix 6]***

4.2.2.8 Adopt of Data Analyzing Process for better improvement in the supply chain execution by the organizations

The ***Figure" 4.8*** depicts the graph of the ***"adoption of the data"*** analysis process by the Organizational members. As stated by Chehbi-Gamoura *et al.* (2020), the analysis process helps make quick decisions in a better way regarding the delivery of the products. ***23.5%*** of people in the company strongly agree regarding the need to adopt analytic techniques for processing the data. ***25.5%*** of people in the organization agree with the improved data collection process required for the improvement of the organization. ***17.6%*** of people have given neutral answers regarding the acceptance of new methods of ***"data processing"***. ***19.6%*** of individuals disagreed with this survey question and think that without adopting the techniques; the organization can achieve growth through other means. ***13.7%*** of people strongly disagree with the advanced ***"data collection process"*** implemented in the organizations.

From the above analysis, the majority of people in the companies agree with the advancement of the new processes and technologies required for the development of the company. This implies that the identification of recent market trends can be obtained by the analytics process. The people who strongly agreed with the questions have gained experience regarding the wider advantage of this technique for the collection of useful data. The people who disagree do not have sufficient knowledge regarding the advancement in technology and innovation of new technology in the market (Hazen *et al.* 2018). The innovation helps in the management of the data regarding examining a large set of data. *[Refer to appendix 6]*

4.2.2.9 Prominent decision for meeting all the requirements of the changing global world and market

The *Figure 4.9* depicts the *"requirement for prominent decisions"* for changing the market trends in the business. As stated by Seyedan and Mafakheri (2020), a significant decision is required to change the processes in the business development of the company. *36%* of people have strongly agreed to make a strong decision regarding the meeting of all the requirements for changing the market of business. *22%* of people in the organization have agreed with a system of advanced planning in making decisions regarding the *"requirement of significant data managing process"* for identifying the *"hidden trends"* in data. *12%* of people have given neutral responses regarding the decision that is required to meet the demands of the customers in the recent market trends. *20%* of people disagreed with the creation of new ideas and taking important decisions for bringing a change in the global world.

About *10%* of individuals strongly disagreed with taking vital decisions for the implementation of new technologies for meeting the business standards. This implies that these people who strongly disagreed do not have the idea regarding the need for *"prominent decisions"* regarding *"advanced growth"* and *"planning"* in the organization (Maheshwari *et al.* 2021). The above graph shows that the maximum number of respondents strongly agreed with making business decisions to meet the demands of the clients and gain a position in the international market. *[Refer to appendix 6]*

4.2.10 Sustainable supply chain ensures sustainable growth of the company

The *Figure 4.10* depicts the responses of the participants of a survey regarding the *"Sustainable supply chain ensuring sustainable growth"*. As stated by Nguyen *et al*. (2018), the management of the products in getting supplied the raw materials and its successful delivery to the customers constitutes the *"supply chain management"*. This chain management system helps in the growth of the company at a higher rate with the involvement

of *"big data analytics"* in the management system. *25.5%* of people strongly agreed with the idea of the supply chain that helps in the management of the products and services. *27.5%* of people agreed with the fact that the company gains *"sustainable growth"* in *"making plans"*, *"managing the source"*, *"making of products"*, and *"delivery and return of products"*.

27.7% of respondents have provided neutrally agreed regarding the usefulness of the *"chain system management"* for the *"development of the organization"*. *11.8%* of people disagreed with the system of supply chain and they think that only controlling the entire production has not led to the growth of the business. *7.8%* of people strongly disagreed with the concept of *"supply chain management"* that is required for meeting the business demands in an organization (Oncioiu *et al*. 2019). This implies that most of the participants agreed and strongly agreed concerning the constant growth of the organization through the involvement of several activities for the delivery of the goods at a particular time. *[Refer to appendix 6]*

4.2.11 Data Analytics helps in Sustainable supply chains management

The *Figure 4.11* indicates the variation in percentage in context to the usefulness of the *"analytics system"* for the *"management of supply chains"*. As stated by Jha *et al.* (2020), the data regarding the shipment of the products and the number of customers who purchased this product. The analytics shows the value of sales in the last few months is recorded in the analytics graph. The *"analytics system"* helps in the product analysis that helps the customers in making buying decisions for those companies' products. *21.6%* of individuals strongly agree that *"data processing"* helps in the management of goods in a significant manner. *33.3%* of people agree on the utility of *"big data analytics"* for *"proper management of the products"*. *17.6%* of participants have given neutral answers regarding the advantage of *"big data"* for making effective decisions for buying the products.

17.6% of respondents disagreed regarding the application of *"Data Analytics"* for the *"development of business"* in the organization. *9.8%* of people strongly disagreed with the effectiveness of the *"analytics system"* in improving the manufacturing of the products. The graph concluded that most people strongly agreed with the application of this system that fulfills the business demands (Bag *et al.* 2020). This implies that adopting the system greatly influences the management process of an organization by helping in making better decisions for the satisfaction of the customers. *[Refer to appendix 6]*

4.2.12 Operational management in big data analytics

The *Figure 4.12* shows the graph regarding the application of *"Operational management in big data analytics"*. As stated by Choi *et al.* (2018), this management includes *"inputs"*, *"operations"* and *"output"*. The inputs include raw materials and machinery, the outputs

include finished goods and operations include quality control. As stated by Liu *et al.* **(**2020**)**, *13.7%* of participants think that management in operations includes the "management in sales", and *29.4%* of people think that *"identification of the risks"* constitutes *"operational management"*. These are followed by *19.6%* of people who think that *"change in management strategies"* and *25.5%* of people think *"management of logistics"* is an important factor for the *"operational management system"*. *11.8%* of people think that the management of the supply chain constitutes an important approach for the management of entire operations in the organization.

The graph implies that maximum participants gave responses in *"identification of potential risks"* in making *"financial planning"* for the business transactions. Therefore, every individual thinks of various management strategies that led to the *"management in the operational processes"* of the organization. *[Refer to appendix 6]*

4.2.13 big data analytics is increasing the demand for chain management

The *Figure 4.13* indicates the graph of views of participant**s** regarding *"Big data analytics increasing the demand for chain management"*. As stated by Govindan *et al.* **(**2018**)**, the demand for data regarding the delivery of the products is increasing at a higher rate in adopting *"Big data analytics"*. This graph shows that *21.6%* of people strongly agreed with the achievement of a *"data processing system"*. *21.6%* of respondents also agreed with *"data analytics"* in the *"management of supply chains"*. *19.6%* of selected participants have given neutral responses regarding the increased demand for *"computer databases"* useful for the transfer of products to international clients. *21.6%* of people disagreed with the respective idea of the management of huge data that is demanding for management of the services.

15.7% of participants strongly disagree with the management of bulky data that are demanded by the customers for evaluating the details of the products and helps in tracking the delivery system. This graph shows a balance between the strongly agreed, disagreed, and agreed with the questions set to them (Bag *et al.* 2020). This implies that an *"analytics system"* may or may not be the only *"increasing factor"* that enhances the efficiency of management starting from supplying raw materials to the delivery of the goods. *[Refer to appendix 6]*

4.2.14 Supply chain management focuses on specific services

The above *Figure 4.14* evaluates the graph based on the services that *"Supply chain management services"* are focused on. As stated by Yu *et al.* **(**2021**)**, there are various targets

of *"Supply chain management"* on which they are focused. The targets shown in the above pie chart are evaluated within the respective percentage of values that the respondents think of focusing on those factors. *26%* of participants think that management services focus on providing good services. *28%* of people that that *"management of supply chain"* help in delivering information from the sources to the customers through proper time management. *14% "of people,"* think *"Supply chain management"* helps in the flow of goods in a significant style without wasting any time and money.

18% of participants have given their views concerning the facility of the flow of services to the customers provided by the *"Supply chain"*. *14%* of respondents shared their answers in providing satisfaction to the customers from this *"chain management system"*. Therefore, maximum respondents from the survey think that this management greatly facilitates costumes in transferring of product and delivery information from the sources to the customers. *[Refer to appendix 6]*

4.2.15 Demand data is useful for adopting the learning of machines

The figure 4.15 reflects the usage of demandable data in adopting the learning of machines to increase the development of *"Big data analysis"* in the *"supply chain management process"*. About *23.5%* of the survey participants show agreement to accept the useful implication of demanded data in enhancing the learning output of the machine. As mentioned by Nguyen *et al.* (2018), the learning output of the machine has a positive impact to enhance the production planning procedure in the *"supply chain"*. However, about *21.6%* of the survey members strongly agreed with the proposed statement while *11.8%* of the members remained neutral. The adaptation of the learning output of the machines helps to increase the demand for the *"data analysis process"* to encourage the customer retention rate in the *"supply chain management process"* (Maheshwari *et al.* 2021). Therefore, about *29.4%* of the involved participants show their disagreement with this proposed survey question and deny the value of demanding data in motivating the learning outcome of the machines. The percentage of strongly disagree participants are nearly about *13.7%* who did not accept the importance of demanding value in generating the learning outflow in *"supply chain management"*. *[Refer to appendix 6]*

4.3 Overall Analysis

4.3.1 Issues that are common to both

The effective supply chain management is handled significantly with the help of big data analytics. As stated by Benzidia *et al.* (2021), the data analytics helps in the use of advanced analytical techniques for interpretation of large amount of data. The findings have shown the study regarding the growth of the company through the management of the data from designing the products to its ultimate delivery of the products to the customers.

The common issues that are identified in the literature review and the discussion section are based on the less efficiency in giving services to many customers. The demand data is greatly important for learning of the handling of the technical machines and instruments require for handling of the data (Liu *et al.* 2020). According to one of the respondents, Mr. Naveen Kumar who used to work in TESCO as a Retail planner stated that inaccurate data will cause fall if used for making strategic decisions. The learning output of the machine has a positive impact to enhance the production planning procedure in the supply chain that is discussed in the literature review and the participants also responded a positive answer based on the use of advanced instruments. A similar respondent, Mr. Dev Hilli, supply chain manager at Health Beacon, said that it is challenging to allocate a budget for big purchases because of the risk associated if demand were to fluctuate in the future.

4.3.2 Issues that are not common to both

Most of the respondents suggested that improving IT system in the organization is not ideal solution as they would prefer hiring or teaching necessary technical skills to the employees rather than spending big amount of the company budget on redeveloping the organization.

Mr. Parth Kulkarni, a sales and operations manager for IBM, said that rather than relying on staff to interact with customers about wanted products, they could instead follow the consumer pattern and move forward as much time will be saved.

4.3.3 Other issues to be considered important

"Big data analytics" helps to shorten the delivery times after processing the order. Hence the author stated that "big data analytics" helps the organization approach the correct route for the employees to complete the orders on time (Hazen *et al.* 2018). The positive effect on the organization development observed through the implementation of big data analytics. The

supply chain management focuses on specific services as provided by the respondents that are not discussed in the literature review. Advanced planning in making decisions regarding the requirement of significant data managing process for identifying the hidden trends in data is effective in making prominent decisions (Maheshwari *et al.* 2021). The change in the global environment has brought by the application of the big data analytics in the organizational operations.

4.4 Chapter Summary

This chapter concludes with the *"demographic analysis"* of the selected participants including the demography of *"age group"* and *"gender"* of the *"participants"*. The survey analysis is concluded with the *"improvement in the supply chain execution"* through the *"data analysis process"*. These are followed by the survey questions on the *"Prominent decision"* taken to meet all the necessities for changing this *"global world and market"*. These are the *"big data analytics"* factors that help in the *"management of supply chains"*.

Chapter 5: Discussion

5.1 Introduction

Big data analysis techniques have many advantages for completing various operations and supply chain management. Big data analysis allows the management to know the basic needs of consumers and clients more, efficiently which helps the organisation to increase its revenue and sales for maximum growth and development of the firm and its branches.

5.2 Discussion of the important findings

5.2.1 Significant role of big data analytics in the organisation

Big data analytics for organisations is the key to success and development in the overall marketing management system. In view with Choi *et al*. (2018), to manage and attract many consumers to the organisation, firms must use "big data analytics" for effective reporting. Based on the drawn report the supply chain management system tried to cope with the exact demand and supply of the respective product and regulate the flow of demand and "supply chain" according to the needs of the market and its various clients across the states.

Findings of the research have provided the exact meaningful insights that are important to conclude such as the hidden patterns insight the market for the respective product, and the known and unknown correlation between the "supply and demand chains". The marketing trends triggered the inflow and outflow change of products in the market and different customer preferences. "Big analytical data" also provides many opportunities to the management team as it allows them to have better decision-making power and clears the vision for filling the gap between demand and supply chain effectively (Hariri *et al*. 2019). It allows for finding the errors and fraudulent activities in the process of the whole "supply chain management" system. "Big data analysis" techniques such as clustering and regression allow the management of a more extensive database to extract the right amount of data by using the newer tools.

Newer tools for analysing the "big data" bases reduce the overall lengthy process and save time. Cloud-based analytics is a significant tool used by the "supply chain management" for saving large amounts of data into the cloud server that directly reduces the cost by saving it in the organisation for the further implication of the study. Moreover, in the findings, it can be

concluded that the newer methods also allow the enterprise to develop newer and innovative products that can fulfil the customer needs. As with the analysis of the market, demand and needs the new products have eliminated all the previous products having the same configuration and ingredients and attracted more customers to the organisation. As mentioned by Tonidandel *et al*. (2018), big data analysis also influences the customer experience as new tools to allow the customers to provide their valuable feedback on the respective product as a good review of the product enhances the product demand and the negative review it affects with a downfall in the demand of the product. Based on the review of the product it allows the enterprise to fill the error of the product regarding the price, quality and design of the product that satisfies the consumer needs. *[Referred to Appendix 5]*

5.1.2 Discussing the supply chain management system for the big data

"Supply chain management" must cover a long procedure from orientation of the product to the destination of the product under which many of the management played their crucial role such as the inventory management that has the role to store the product and release the product with increasing demand in the market. As argued by Mikalef *et al.* (2019), transportation management transfers goods and services from one place to another as per the desired quantity. Although big data analytics help all the management fields for preparing their strategies and planning with effective measures that do not affect the quality of the product and damage the product in the whole process.

"Supply chain" analytics in their management system under which various firms form the raw material supplier to the producers, wholesalers, retailers, and the end-user of the product. "Supply chain" in the context of the overall process not only includes the physical flows of the product and the transfer of materials but also ensures the information regarding the financial flows. Well-planned strategies and planning of the "supply chain management" by extracting the data contribute directly to the bottom line in reducing the sources of materials and raw products, along with the disposal cost (Rehman *et al*. 2019). Procurement, storing, and deliveries are the main aspect and the key function that the supply chain management focuses on and contributes to data engaging the big data analytics. As these provide the other management system to increase the coordination amongst each other that can reduce the risk of failure such as damaging of the product and rotting of the edible products that have led to financial losses in the organisation and result in failure of the overall task managed by the "supply chain management system". "Supply chain management system" to analyse the big data allows them to have a significant change and effect on the demand and supply chain

performance. As this allows the managers and researchers to use descriptive, statistical, and operational approaches and techniques that help them with solving the issue of balancing the right amount of demand and supply of the product in the market that does not affect its price due to changing demand of the respective product. In the context of Saggi and Jain (2018), purchasing the raw materials is the priority and duty of the management for inducing business operations that include transportation and logistics, and resource management. It ensures all the availability of the resources and raw materials and allocates the budget on specific minerals and materials, which have been used in the process of manufacturing the product. It has increased demand and, in the market, and eliminates the unnecessary resources that help with the inventory stock in maintaining the balance of inflow and outflow of product in the market that affect the financial flows for the respective organisation.

5.1.3 Evaluating the role of tools and techniques in big data analytics

Using new tools and techniques for analysing big data helps the organisation in various ways and provides the effective output of data that has the potential to increase the performance of demand and supply chain.

A/B testing tool

This tool and technique allow the management to compare a major group with various common groups. It provides the opportunity to change and improve in the specific task and goal regarding the demand and supply of products based on the researched market. This tool can analyse huge numbers and minimises the differences as this can analyse a large group in the market that provides more accuracy in the dataset (Ferraris *et al.* 2018). It eliminates the risk of accessing or lowering demand for respective goods and services.

Data mining

It is the most prominent and common tool used by the "supply chain management system" to analyse big data files. It has the responsibility of combining the methods for the numerous data and machine learning for database management. It works on the principle of designing that allows them to identify various patterns of changes in demand and supply chain that help the organisation in creating immediate action plans regarding the manufacturing and transporting units.

Machine learning outputs

It works in the fields of artificial intelligence (AI) technology and allows the users to analyse the data. As mentioned by Tabesh *et al.* (2019), emerging from the sources of computer and technological science it has been structured with various algorithms that allow machine

learning for producing new assumptions and statements based on the summarised data that is impossible for the supply management team to build on their own.

Descriptive statistics

This is the most efficient and effective technique used by the management team for drawing strategies and conclusions regarding the products. It has an algorithm that works on collecting, summarising, organising, and interpreting the provided big data collected for the sources of surveys and experiments conducted in the market. It has the advantage as it has concerns directly with the field and its consumers that allows them to gather specific information for the particulars and their personal views and perspective regarding the product aspect such as the price, quality, and design (Vassakis *et al.* 2018). Based on this the organisation can change the major aspect and increase the product demand for gaining revenue and profits and increase their financial standards and position.

5.1.4 Big data analytics and its implication in supply chain management

The huge dataset is characterised as a gigantic and complex set of information that has much importance in the organisation for determining the various aspects that change the demand and supply of products and services. In opined by Hazen *et al.* (2018), implementing the analysis of data eliminates the old traditional methods for analysing data and increases the capability in several aspects such as storing the goods and services, visualising the presentation of the products, handling goods with proper care in the inventory and eliminating unnecessary stocks.

Increased capabilities

The data with big volumes have many errors and problems and using the old techniques cannot eliminate all the errors because of the large volume hence new tools increase the overall capabilities. It has the responsibility to analyse all kinds of data which are completely different from each other. It extracts all the data from every possible source such as data in the form of images, voice, discourse, and texts Raut et al. (2019). It changed its form from unstructured or semi-structured to a complete structured form that later helped the management to evaluate the planning and strategies for the aching aim and objective of the project.

Progressive descriptive analysis

Improving the quality of data in big data analytics allows the supply chain management team to determine the various forms of data such as "Radio frequency identification" (RFID), "Global positioning system"(GPS), "Point of sales" (POS) which has importance for the

completion of the task. As argued by Singh and Kassar (2019), it also evaluates the frame of Instagram, Twitter handle, Facebook application, call centres and customer blogs based on which new strategies and planning can be drawn upon for maintaining the balance of chain between demand and supply. Progressive is the term used for analysing all the above-discussed forms of data with the effective measure as it is generally concerned with people's views and perspectives and helps the organisation and supply chain management system.

5.2 Comparison of the result with other published works

Comparing the study with other published works helped the researcher to determine other major aspects that are not present in the provided study. In the context of Ghani *et al*. (2019), this study mainly explains all the tools, techniques, and methods for analysing big data and shows its importance for filing and maintaining the balance between the supply and demand chains. In completing the study and comparing it with other works it has been observed that change in supply and demand highly influences the market overall. Change in the market changes the trending, desires, and needs of the consumers along with their changes in satisfaction and desire level. It focussed on the inflow and outflow of the product from the inventory to the market but did not discuss the impact on the market. Therefore, in this segment, it has been discussed that the right flow and balance between the chains help the organisation with an ongoing flow of the firm (Bag *et al.* 2020). Any gap and error in the chain can result in the downfall of the organisational performance of the organisation and lead to financial losses.

5.3 Strength and limitations of the study

5.3.1 Strength of the study

In this research study, the researcher found various approaches to the data analysis process and its impact on "supply chain management". The researcher discussed many factors to analyze this research study. From this study, the researcher got much effective information that positively impacts organizational growth. As suggested by Alotaibi *et al.* (2020), the role of the data analyses is very much effective to increase organizational development and enhance employee engagement. After reviewing all the critical views of the authors from the published books and journals it can be informed that in the organizational sector the employees process an enormous amount of data by adopting the data analyzing process. According to this research study the researcher completed this study gladly without any

disruption. This research study was very much cost-effective, and the planned strategies make this research study successful.

Innovation of the new technologies in the organization and spreading technological knowledge among the employees increases the data analysis process for the improvement of supply chain execution (Anitha and Patil, 2018). This research study provides validity and reliability to this research topic. This research study reflects the informative point of view about the implementation of the data analyzing process in the organizational sector for executing the supply chain. The published books and journals make this research study more informative and broad-based. This study makes this research topic versatile and valuable for continuing future studies successfully. Therefore, the strength of this research study helps the researcher in the compilation of this research study. The strength of the research study provides enormous knowledge over this research study.

5.3.2 Limitation of the study

In this research study, the researcher has faced many problems regarding this research topic. During this research study, the researcher collected much insufficient information, and samples made this research study inauthentic. As suggested by Oncioiu *et al.* (2018), the limitation of the research study makes the study approaches invaluable and creates issues for further study. The researcher collected many inadequate sample sizes that brought errors to the statistical measurements. Lack of proper resources and sufficient information the research faced many problems during this research study. Some expired published work and journals formed many issues that make this research study inauthentic.

To get the approximate information, the researcher looked for some latest published books that were costly. Lack of time also created various limitations in this research study. Proper timing could make this research study valuable. The lack of advanced tools and equipment created limitations for this research study. Accessibility of the limited data raised many issues during this research study (Hazen et al. 2018). These limitations of this study indicate inscriptions the possible weakness of the study. Identifying the limitation makes able the researcher for getting the benefits in the future. This identified weakness can enhance the possible implication of the research study to get better results from the future study. Therefore, the researcher needs to disrupt all the limitations to get the depth knowledge about the research study. All the research studies face limitations, for this dressing describing the limitations can motivate the researchers and the commentators.

5.4 Summary

The overall study has discussed the various tools and techniques for analysing and summarising the big data that carries a lot of numbers, images, and complex variables. It has several advantages for the organisation to eliminate the errors and problems related to the factual data that can change the overall pattern and strategies for overcoming the situation of changing demand and supply chain in the market that influences the whole marketing management system.

References

Anitha, P. and Patil, M.M., 2018. A review on data analytics for "supply chain management": a case study. *International Journal of Information Engineering and Electronic Business*, *10*(5), p.30.

Arunachalam, D., Kumar, N. and Kawalek, J.P., 2018. Understanding big data analytics capabilities in supply chain management: Unravelling the issues, challenges and implications for practice. *Transportation Research Part E: Logistics and Transportation Review*, *114*, pp.416-436

Arunachalam, D., Kumar, N. and Kawalek, J.P., 2018. Understanding "Big data analytics" capabilities in "supply chain management': Unravelling the issues, challenges and implications for practice. *Transportation Research Part E: Logistics and Transportation Review*, *114*, pp.416-436.

Aryal, A., Liao, Y., Nattuthurai, P. and Li, B., 2018. The emerging big data analytics and IoT in supply chain management: a systematic review. Supply Chain Management: An International Journal.

Aryal, A., Liao, Y., Nattuthurai, P. and Li, B., 2018. The emerging "Big data analytics" and IoT in "supply chain management': a systematic review. *"supply chain management': An International Journal*.

Awwad, M., Kulkarni, P., Bapna, R. and Marathe, A., 2018, September."Big data analytics" in supply chain: a literature review. In *Proceedings of the international conference on industrial engineering and operations management* (Vol. 2018, pp. 418-25).

Bag, S., Wood, L.C., Xu, L., Dhamija, P. and Kayikci, Y., 2020. "Big data analytics" as an operational excellence approach to enhance sustainable supply chain performance. *Resources, Conservation and Recycling*, *153*, p.104559.

Bag, S., Wood, L.C., Xu, L., Dhamija, P. and Kayikci, Y., 2020. Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. *Resources, Conservation and Recycling*, *153*, p.104559.

Benzidia, S., Makaoui, N. and Bentahar, O., 2021. The impact of big data analytics and artificial intelligence on green supply chain process integration and hospital environmental performance. *Technological Forecasting and Social Change*, *165*, p.120557.

Brinch, M., Stentoft, J., Jensen, J.K. and Rajkumar, C., 2018. Practitioners understanding of big data and its applications in supply chain management. *The International Journal of Logistics Management*.

Brinch, M., Stentoft, J., Jensen, J.K. and Rajkumar, C., 2018.Practitioners understanding of big data and its applications in "supply chain management'.*The International Journal of Logistics Management*.

Charmaz, K. and Thornberg, R., 2021. The pursuit of quality in grounded theory.*Qualitative Research in Psychology*, *18*(3), pp.305-327.

Chehbi-Gamoura, S., Derrouiche, R., Damand, D. and Barth, M., 2020. Insights from big Data Analytics in supply chain management: an all-inclusive literature review using the SCOR model. *Production Planning & Control*, *31*(5), pp.355-382.

Chehbi-Gamoura, S., Derrouiche, R., Damand, D. and Barth, M., 2020. Insights from "Big data analytics" in "supply chain management': an all-inclusive literature review using the SCOR model. *Production Planning & Control*, *31*(5), pp.355-382.

Del Giudice, M., Chierici, R., Mazzucchelli, A. and Fiano, F., 2020."supply chain management' in the era of circular economy: the moderating effect of big data. *The International Journal of Logistics Management*.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N. and Lim, W.M., 2021. How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, pp.285-296.

Govindan, K., Cheng, T.E., Mishra, N. and Shukla, N., 2018. "Big data analytics" and application for logistics and "supply chain management'.*Transportation Research Part E: Logistics and Transportation Review*, *114*, pp.343-349.

Govindan, K., Cheng, T.E., Mishra, N. and Shukla, N., 2018. Big data analytics and application for logistics and supply chain management. *Transportation Research Part E: Logistics and Transportation Review*, *114*, pp.343-349.

Hazen, B.T., Skipper, J.B., Boone, C.A. and Hill, R.R., 2018. Back in business: Operations research in support of "Big data analytics" for operations and "supply chain management'. *Annals of Operations Research*, *270*(1), pp.201-211.

Khoreva, V. and Wechtler, H., 2020.Exploring the consequences of knowledge hiding: an agency theory perspective.*Journal of Managerial Psychology*.

Lambert, M., 2019.Grounded theory.*Practical research methods in education: An early researcher's critical guide*, pp.132-141.

Maheshwari, S., Gautam, P. and Jaggi, C.K., 2021. Role of "Big data analytics" in "supply

chain management': current trends and future perspectives. *International Journal of Production Research*, *59*(6), pp.1875-1900.

Nguyen, T., Li, Z.H.O.U., Spiegler, V., Ieromonachou, P. and Lin, Y., 2018. Big data analytics in supply chain management: A state-of-the-art literature review. *Computers & Operations Research*, *98*, pp.254-264.

Nguyen, T., Li, Z.H.O.U., Spiegler, V., Ieromonachou, P. and Lin, Y., 2018."Big data analytics" in "supply chain management': A state-of-the-art literature review. *Computers & Operations Research*, *98*, pp.254-264.

Raman, S., Patwa, N., Niranjan, I., Ranjan, U., Moorthy, K. and Mehta, A., 2018. Impact of big data on supply chain management. *International Journal of Logistics Research and Applications*, *21*(6), pp.579-596.

Raman, S., Patwa, N., Niranjan, I., Ranjan, U., Moorthy, K. and Mehta, A., 2018.Impact of big data on "supply chain management'.*International Journal of Logistics Research and Applications*, *21*(6), pp.579-596.

Rindfleisch, A., 2020. Transaction cost theory: past, present and future. AMS Review, 10(1), pp.85-97.

Safriliana, R., Subroto, B., Subekti, I. and Rahman, A.F., 2018. An overview on contracting theory and agency theory: determinants of voluntary public accounting firms switching. *KnE Social Sciences*.

Schwartz, J.M., Markowitz, S.D., Yanofsky, S.D., Tackett, S., Berenstain, L.K., Schwartz, L.I., Flick, R., Heitmiller, E., Fiadjoe, J., Lee, H.H. and Honkanen, A., 2021. Empowering women as leaders in pediatric anesthesiology: methodology, lessons, and early outcomes of a national initiative. *Anesthesia & Analgesia*, *133*(6), pp.1497-1509.

Seyedan, M. and Mafakheri, F., 2020. Predictive "Big data analytics" for supply chain demand forecasting: methods, applications, and research opportunities. *Journal of Big Data*, *7*(1), pp.1-22.

Shahab, S. and Viallon, F.X., 2019. A transaction cost analysis of Swiss land improvement syndicates. *Town Planning Review*, *90*(5), pp.545-565.

Singh, S.K. and El-Kassar, A.N., 2019. Role of big data analytics in developing sustainable capabilities. *Journal of cleaner production*, *213*, pp.1264-1273.

Tiwari, S., Wee, H.M. and Daryanto, Y., 2018."Big data analytics" in "supply chain management' between 2010 and 2016: Insights to industries. *Computers & Industrial Engineering, 115*, pp.319-330.

Pepperdata, 2022,. *"The-relentless-growth-of-big-data-and-the-challenge-to-apm-and-developers, Pepperdata*, . Available at: https://www.pepperdata.com/blog/the-relentless-growth-of-big-data-and-the-challenge-to-apm-and-developers/ [Accessed on 16th June 2022]

Statista.com, 2022, . *"Global-supply-chain-challenges*", *Statista.com.* Available at:. [Accessed on 16th June 2022]

Gstatic , 2021,. " *Big Growth of Big Data on Supply chain management*", *Gstatic*, Available at:

https://encryptedtbn0.gstatic.com/images?q=tbn:ANd9GcSoAhq_9pFvjTF4uXsa2H1XDPjnR4l_RG1yhu-OT7Xcgj3QOkwIjcF4HeLYmdvL7tGJHRE&usqp=CAU. [Accessed on 16th June 2022]

Chapter 4

Alotaibi, S., Mehmood, R. and Katib, I., 2020. The role of big data and twitter data analytics in healthcare supply chain management. In *Smart infrastructure and applications* (pp. 267-279). Springer, Cham.

Anitha, P. and Patil, M.M., 2018. A review on data analytics for supply chain management: a case study. *International Journal of Information Engineering and Electronic Business*, *10*(5), p.30.

Aryal, A., Liao, Y., Nattuthurai, P. and Li, B., 2018. The emerging big data analytics and IoT in supply chain management: a systematic review. *Supply Chain Management: An International Journal*.

Bag, S., Gupta, S. and Wood, L., 2020. Big data analytics in sustainable humanitarian supply chain: Barriers and their interactions. Annals of Operations Research, pp.1-40.

Bag, S., Wood, L.C., Xu, L., Dhamija, P. and Kayikci, Y., 2020. Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. *Resources, Conservation and Recycling*, *153*, p.104559.

Bag, S., Wood, L.C., Xu, L., Dhamija, P. and Kayikci, Y., 2020. Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. Resources, Conservation and Recycling, 153, p.104559.

Brinch, M., Stentoft, J., Jensen, J.K. and Rajkumar, C., 2018. Practitioners understanding of big data and its applications in supply chain management. *The International Journal of Logistics Management*.

Chehbi-Gamoura, S., Derrouiche, R., Damand, D. and Barth, M., 2020. Insights from Big Data Analytics in supply chain management: an all-inclusive literature review using the SCOR model. *Production Planning & Control*, *31*(5), pp.355-382.

Chehbi-Gamoura, S., Derrouiche, R., Damand, D. and Barth, M., 2020. Insights from big Data Analytics in supply chain management: an all-inclusive literature review using the SCOR model. Production Planning & Control, 31(5), pp.355-382.

Choi, T.M., Wallace, S.W. and Wang, Y., 2018. Big data analytics in operations management. Production and Operations Management, 27(10), pp.1868-1883.

Fosso Wamba, S., Gunasekaran, A., Dubey, R. and Ngai, E.W., 2018. Big data analytics in operations and supply chain management. *Annals of Operations Research*, *270*(1), pp.1-4.

Fosso Wamba, S., Gunasekaran, A., Dubey, R. and Ngai, E.W., 2018. Big data analytics in operations and supply chain management. Annals of Operations Research, 270(1), pp.1-4.

Govindan, K., Cheng, T.E., Mishra, N. and Shukla, N., 2018. Big data analytics and application for logistics and supply chain management. Transportation Research Part E: Logistics and Transportation Review, 114, pp.343-349.

Hazen, B.T., Skipper, J.B., Boone, C.A. and Hill, R.R., 2018. Back in business: Operations research in support of big data analytics for operations and supply chain management. *Annals of Operations Research*, *270*(1), pp.201-211.

Hazen, B.T., Skipper, J.B., Boone, C.A. and Hill, R.R., 2018. Back in business: Operations research in support of big data analytics for operations and supply chain management. Annals of Operations Research, 270(1), pp.201-211.

Jha, A.K., Agi, M.A. and Ngai, E.W., 2020. A note on big data analytics capability development in supply chain. *Decision Support Systems*, *138*, p.113382.

Jha, A.K., Agi, M.A. and Ngai, E.W., 2020. A note on big data analytics capability development in supply chain. Decision Support Systems, 138, p.113382.

Liu, J., Chen, M. and Liu, H., 2020. The role of big data analytics in enabling green supply chain management: a literature review. *Journal of Data, Information and Management*, *2*(2), pp.75-83.

Liu, J., Chen, M. and Liu, H., 2020. The role of big data analytics in enabling green supply chain management: a literature review. Journal of Data, Information and Management, 2(2), pp.75-83.

Maheshwari, S., Gautam, P. and Jaggi, C.K., 2021. Role of Big Data Analytics in supply chain management: current trends and future perspectives. *International Journal of Production Research*, *59*(6), pp.1875-1900.

Maheshwari, S., Gautam, P. and Jaggi, C.K., 2021. Role of Big Data Analytics in supply chain management: current trends and future perspectives. International Journal of Production Research, 59(6), pp.1875-1900.

Nguyen, T., Li, Z.H.O.U., Spiegler, V., Ieromonachou, P. and Lin, Y., 2018. Big data analytics in supply chain management: A state-of-the-art literature review. *Computers & Operations Research*, *98*, pp.254-264.

Nguyen, T., Li, Z.H.O.U., Spiegler, V., Ieromonachou, P. and Lin, Y., 2018. Big data analytics in supply chain management: A state-of-the-art literature review. Computers & Operations Research, 98, pp.254-264.

Oncioiu, I., Bunget, O.C., Türkeş, M.C., Căpușneanu, S., Topor, D.I., Tamaș, A.S., Rakoș, I.S. and Hint, M.Ș., 2019. The impact of big data analytics on company performance in supply chain management. *Sustainability*, *11*(18), p.4864.

Oncioiu, I., Bunget, O.C., Türkeş, M.C., Căpușneanu, S., Topor, D.I., Tamaș, A.S., Rakoș, I.S. and Hint, M.Ș., 2019. The impact of big data analytics on company performance in supply chain management. Sustainability, 11(18), p.4864.

Seyedan, M. and Mafakheri, F., 2020. Predictive big data analytics for supply chain demand forecasting: methods, applications, and research opportunities. *Journal of Big Data*, *7*(1), pp.1-22.

Seyedan, M. and Mafakheri, F., 2020. Predictive big data analytics for supply chain demand forecasting: methods, applications, and research opportunities. Journal of Big Data, 7(1), pp.1-22.

Talwar, S., Kaur, P., Fosso Wamba, S. and Dhir, A., 2021. Big Data in operations and supply chain management: a systematic literature review and future research agenda. *International Journal of Production Research*, *59*(11), pp.3509-3534.

Tiwari, S., Wee, H.M. and Daryanto, Y., 2018. Big data analytics in supply chain management between 2010 and 2016: Insights to industries. *Computers & Industrial Engineering, 115*, pp.319-330.

Yu, W., Wong, C.Y., Chavez, R. and Jacobs, M.A., 2021. Integrating big data analytics into supply chain finance: The roles of information processing and data-driven culture. International journal of production economics, 236, p.108135.

Chapter 5

Bag, S., Wood, L.C., Xu, L., Dhamija, P. and Kayikci, Y., 2020. Big data analytics as an operational excellence approach to enhance sustainable supply chain performance. *Resources, Conservation and Recycling*, *153*, p.104559.

Choi, T.M., Wallace, S.W. and Wang, Y., 2018. Big data analytics in operations management. *Production and Operations Management*, *27*(10), pp.1868-1883.

Ferraris, A., Mazzoleni, A., Devalle, A. and Couturier, J., 2018. Big data analytics capabilities and knowledge management: impact on firm performance. *Management Decision*.

Ghani, N.A., Hamid, S., Hashem, I.A.T. and Ahmed, E., 2019. Social media big data analytics: A survey. Computers in Human Behavior, 101, pp.417-428.

Hariri, R.H., Fredericks, E.M. and Bowers, K.M., 2019. Uncertainty in big data analytics: survey, opportunities, and challenges. *Journal of Big Data*, *6*(1), pp.1-16.

Hazen, B.T., Skipper, J.B., Boone, C.A. and Hill, R.R., 2018. Back in business: Operations research in support of big data analytics for operations and supply chain management. *Annals of Operations Research*, *270*(1), pp.201-211.

Mikalef, P., Boura, M., Lekakos, G. and Krogstie, J., 2019. Big data analytics and firm performance: Findings from a mixed-method approach. *Journal of Business Research*, *98*, pp.261-276.

Raut, R.D., Mangla, S.K., Narwane, V.S., Gardas, B.B., Priyadarshinee, P. and Narkhede, B.E., 2019. Linking big data analytics and operational sustainability practices for sustainable business management. *Journal of cleaner production*, *224*, pp.10-24.

Saggi, M.K. and Jain, S., 2018. A survey towards an integration of big data analytics to big insights for value-creation. *Information Processing & Management*, *54*(5), pp.758-790.

Singh, S.K. and El-Kassar, A.N., 2019. Role of big data analytics in developing sustainable capabilities. *Journal of cleaner production*, *213*, pp.1264-1273.

Tabesh, P., Mousavidin, E. and Hasani, S., 2019. Implementing big data strategies: A managerial perspective. *Business Horizons*, *62*(3), pp.347-358.

Tonidandel, S., King, E.B. and Cortina, J.M., 2018. Big data methods: Leveraging modern data analytic techniques to build organizational science. Organizational Research Methods, 21(3), pp.525-547.

ur Rehman, M.H., Yaqoob, I., Salah, K., Imran, M., Jayaraman, P.P. and Perera, C., 2019. The role of big data analytics in industrial Internet of Things. *Future Generation Computer Systems*, *99*, pp.247-259.

Vassakis, K., Petrakis, E. and Kopanakis, I., 2018. Big data analytics: applications, prospects and challenges. *Mobile big data*, pp.3-20.
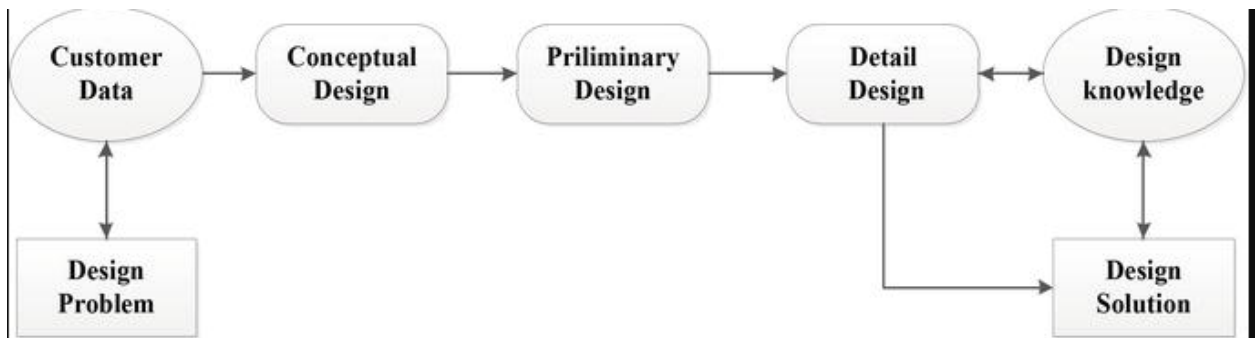
Appendices
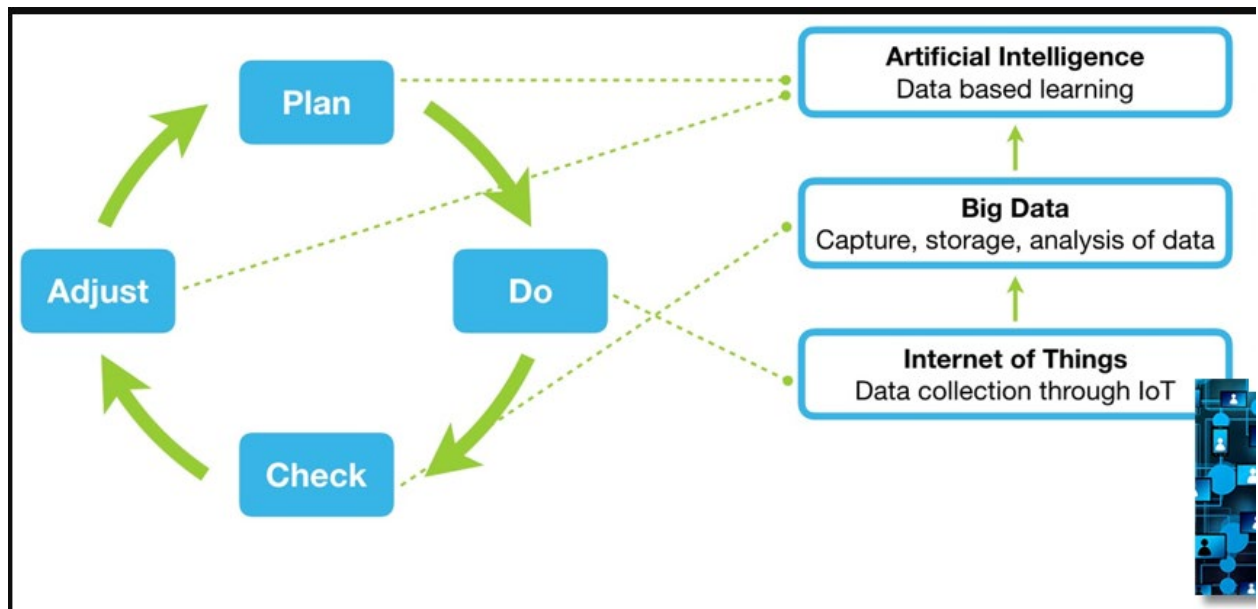
Appendix 1: Challenges of the big data analytics

(Source: https://www.abigdatablog.com/post/series-1-part-7-big-data-challenges)

Appendix 2: Big data analytics

(Source:https://api.intechopen.com/media/chapter/69320/media/F2.png)

Appendix 3: Connection between big data and artificial intelligence

(Source:
https://www.supplychain247.com/images/article/internet_of_things_big_data_are_acceleratin
g_supply_chain_chart1.jpg)

Appendix 4: Survey questions

1. What is your age?
2. What is your Gender?
3. Do you agree that data analytics has potential to contribute positively in the business improvement?
    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree
4. Do you think the present condition has created adversities in supply chain management?
    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree
5. Do you agree that data analysis can contribute positively in the supply change management?
    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree
6. Do you think data analysis has positively affected on organizational operations after pandemic outbreak and exposure to several data analytic tools have increased?
    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree

7. How the data analysis can improve the decision-making operation in several organizations?

- Adopting the modern technologies in the organization
- Improving the IT system in the organization
- Enhance the data processing services in the organizational sector
- Increasing the technological skills among the employees
- Managing the communication level among the employees and consumers

8. Do you think that the organizations need to adopt the data analyzing process for the better improvement in the supply chain execution?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

9. Prominent decision is necessary to meet all the requirements of this changing global world and market. Agree or disagree?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

10. Sustainable supply chains ensure sustainable growth of the company. Agree or disagree?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

11. Do you think how data analytics help in the supply chain management?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

12. What do you think about operational management in big data analytics?

- Management of sales
- Identification of the risks
- Change in management strategies
- Management of logistics
- Management of supply chain

13. Do you think big data analytics is gaining achievement in increasing the demand of chain management?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

14. What do you think supply chain management focuses on?

- Good services
- Information from sources to customers
- Flow of goods
- Flow of services
- Satisfaction of customers

15. Do you think demand data is useful adopting the learning of machines?

- Strongly agree
- Agree
- Neutral
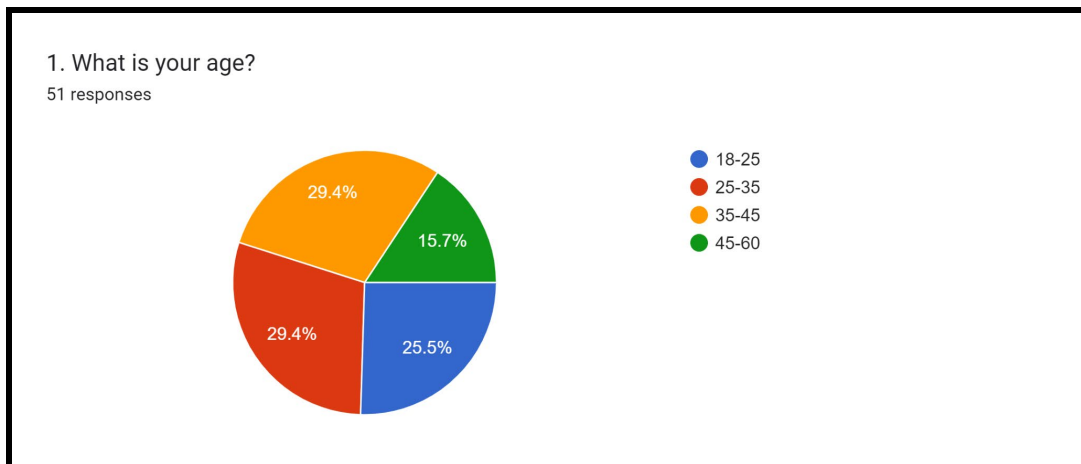- Disagree
- Strongly Disagree

Appendix 5: Role of tools and technique in big data analytics

(Source: https://bigdata-world.net/big-data-tools-big-data-analytics-tools-in-2020/)

Appendix 6: Survey analysis

4.2.1.1 Age

1. What is your age?
51 responses

- 18-25
- 25-35
- 35-45
- 45-60

29.4%
15.7%
29.4%
25.5%

4.2.1.2 Gender

2. What is your Gender?
50 responses
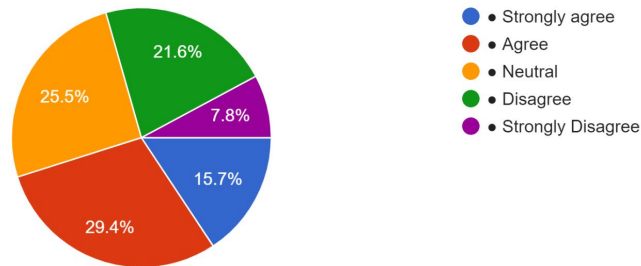
- Male
- Female
- Other

40%
18%
42%
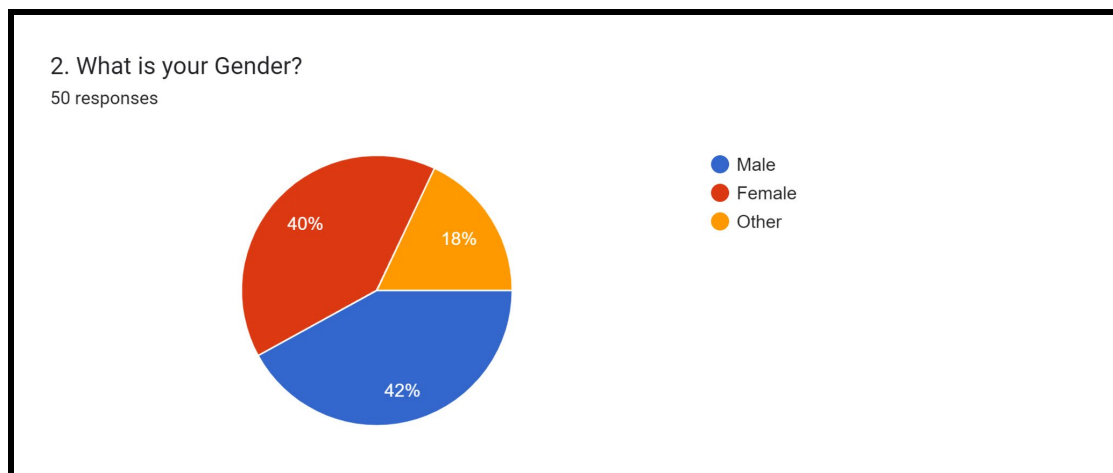
4.2.2.3 Positive contribution of the data analysis process in supply chain management

3. Do you agree that data analytics has potential to contribute positively in the business improvement?

51 responses

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

21.6%
7.8%
15.7%
29.4%
25.5%

4.2.2.4 Present condition of supply chain management

4. Do you think the present condition has created adversities in supply chain management?

51 responses

- Strongly agree
- Agree
- Neutral
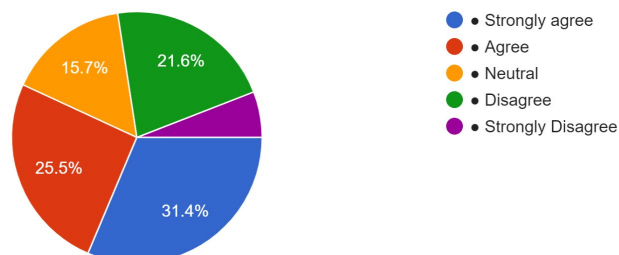- Disagree
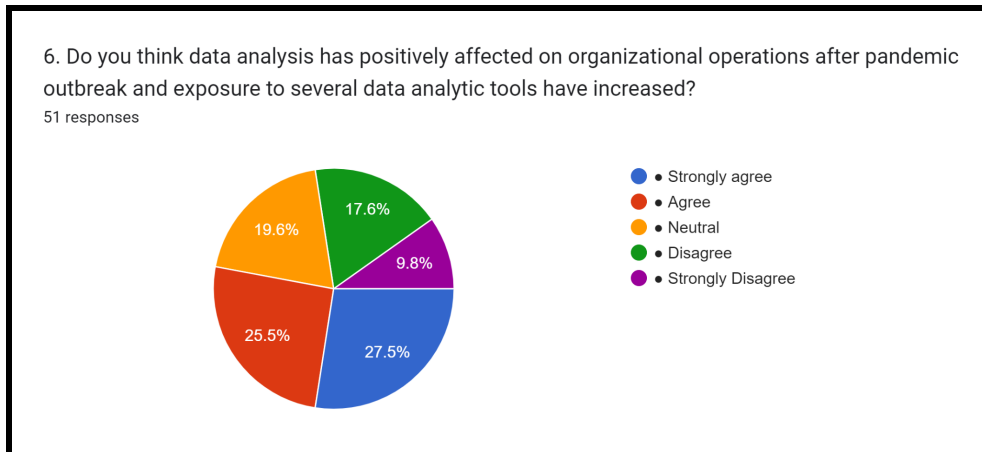- Strongly Disagree

17.6%
7.8%
31.4%
21.6%
21.6%
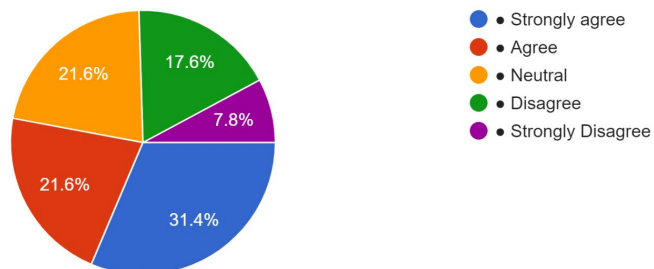
4.2.2.5 Positive contribution of the data analysis process in supply chain management

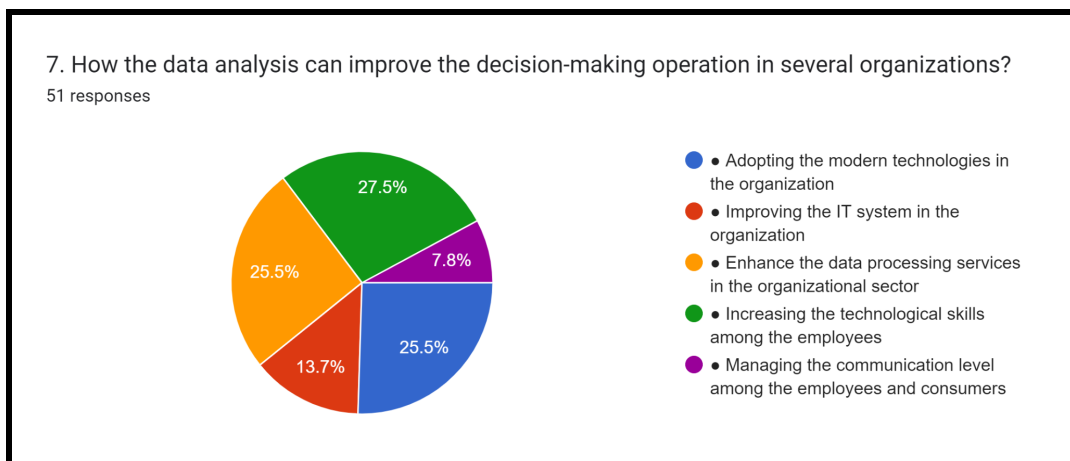5. Do you agree that data analysis can contribute positively in the supply change management?
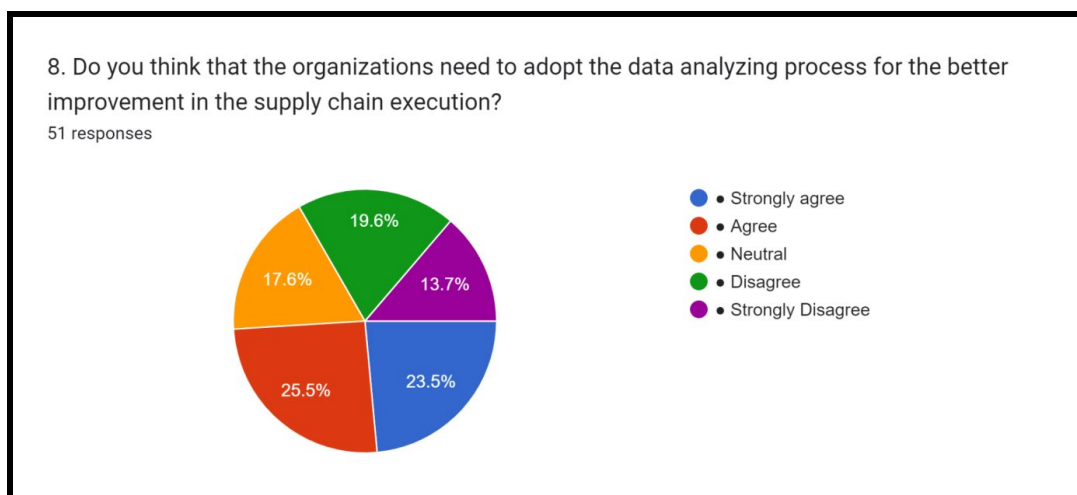
51 responses

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

21.6%
15.7%
25.5%
31.4%

4.2.2.6 Impact of data analysis on organizational operations

6. Do you think data analysis has positively affected on organizational operations after pandemic outbreak and exposure to several data analytic tools have increased?
51 responses

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

17.6%
9.8%
19.6%
25.5%
27.5%

4.2.2.7 Improvement of the decision-making process in several organizations

7. How the data analysis can improve the decision-making operation in several organizations?
51 responses

- Adopting the modern technologies in the organization
- Improving the IT system in the organization
- Enhance the data processing services in the organizational sector
- Increasing the technological skills among the employees
- Managing the communication level among the employees and consumers

27.5%
7.8%
25.5%
13.7%
25.5%

4.2.2.8 Adopt of Data Analyzing Process for better improvement in the supply chain execution by the organizations

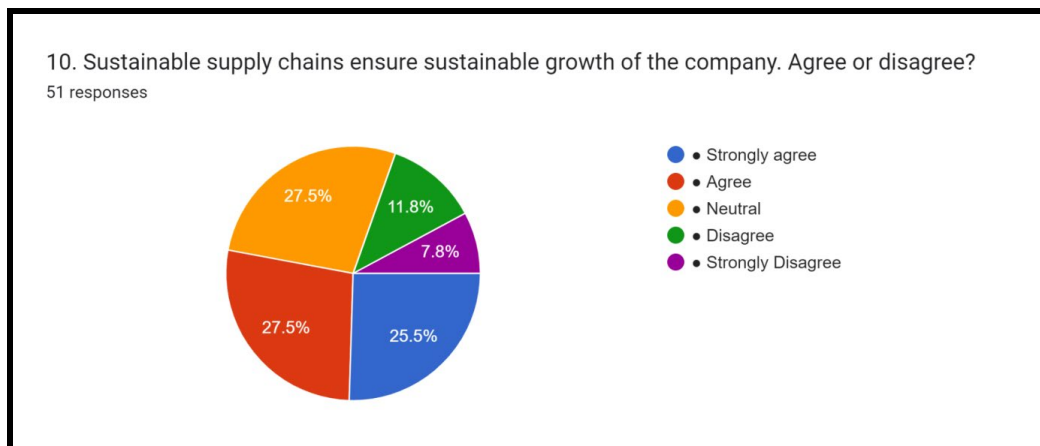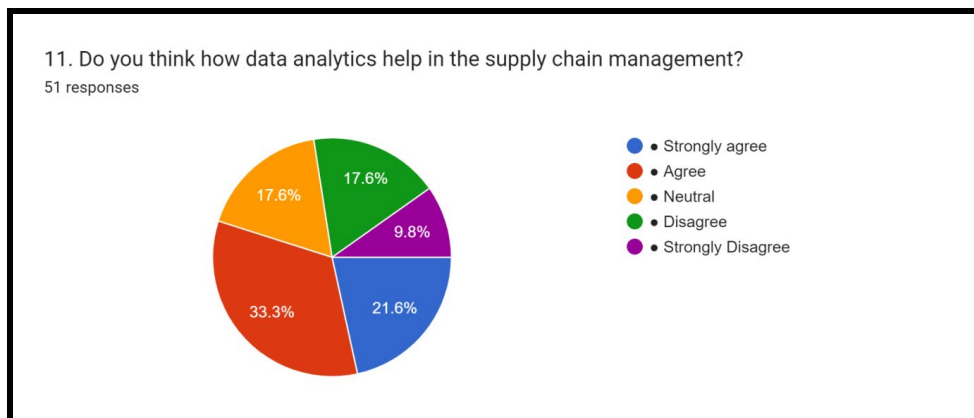8. Do you think that the organizations need to adopt the data analyzing process for the better improvement in the supply chain execution?
51 responses

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

19.6%
13.7%
17.6%
25.5%
23.5%

4.2.2.9 Prominent decision for meeting all the requirements of the changing global world and market

9. Prominent decision is necessary to meet all the requirements of this changing global world and market. Agree or disagree?
50 responses

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

20%
12%
22%
36%
10%

4.2.10 Sustainable supply chain ensures sustainable growth of the company

10. Sustainable supply chains ensure sustainable growth of the company. Agree or disagree?
51 responses

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

27.5%
11.8%
7.8%
27.5%
25.5%

4.2.11 Data Analytics helps in Sustainable supply chains management

11. Do you think how data analytics help in the supply chain management?
51 responses

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

17.6%
17.6%
9.8%
33.3%
21.6%

4.2.12 Operational management in big data analytics

12. What do you think about operational management in big data analytics?
51 responses

- Management of sales
- Identification of the risks
- Change in management strategies
- Management of logistics
- Management of supply chain

25.5%
11.8%
13.7%
29.4%
19.6%

4.2.13 big data analytics is increasing the demand for chain management

13. Do you think big data analytics is gaining achievement in increasing the demand of chain management?
51 responses

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

21.6%
15.7%
19.6%
21.6%
21.6%

4.2.14 Supply chain management focuses on specific services

14. What do you think supply chain management focuses on?
50 responses

- Good services
- Information from sources to customers
- Flow of goods
- Flow of services
- Satisfaction of customers

18%
14%
14%
28%
26%

4.2.15 Demand data is useful for adopting the learning of machines

15. Do you think demand data is useful adopting the learning of machines?

51 responses

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree