South Asian Journal of Operations and Logistics
2024 Vol. 3, No. 2, pp. 100-112
DOI: 10.57044/SAJOL.2024.3.2.2431

Applying big data and supply chain innovation for organizational performance

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Article History

Received: 02 June 2023
Revised: 11 January 2024

JEL Classification
N70
R41
O00

ABSTRACT

Most companies want to improve their business and performance by accessing the information which is available on social media and enhancing their revenue. Processing and analyzing data through Big data is one of the most trending knowledge in this era; for revolutionary transformation, we are using big data as a guide tool. In this research, the significant factors focus on Big data and supply chain innovation and their impact on organizational performance. This research has covered Karachi's organizations working in supply chain practices. This research was quantitative-based with a sample size of 140, and the data was collected by questionnaire from the employees working in the supply chain domain. The findings found that both hypotheses were supported, meaning that big data and supply chain innovations significantly influence organizational performance.

Keywords: *Big data, Supply chain innovation, Organizational performance, SPSS, Quantitative research*

Citation of this article:

Iqbal, B. (2024). Applying big data and supply chain innovation for organizational performance. *South Asian Journal of Operations and Logistics*, *3*(2), 100-112. https://doi.org/10.57044/SAJOL.2024.3.2.2431

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1. Introduction

1.1 Background of the Study

Big data terminology is used for the volume of high-speed data, which is the information that can be examined or analyzed through this strategy. A few lines and mainlands worldwide have changed the business environment quickly, changing clients' practices and necessities from another viewpoint (Rashid et al., 2023). Most originations face competitive pressure (Bienhaus & Haddud, 2018). Big Data is considered an esteemed resource, which is amazing at an informational level. The consistency of this volume is high and expanding. The world is fast growing towards a technological environment. For the past decade, the world has reached the fastest way to collect data, and Big Data is one of the ways that the world can capture its required market or elope. Collecting large amounts of information and conducting all investigations is a way for organizations to handle or deal with new competition (Walls & Barnard, 2020; Rashid et al., 2022a).

It is not easy to consider for researchers but not as easy for those willing to choose (Queiroz & Telles, 2018). Big data will be a great innovation in the future because organizations want to change their business strategies and redesign their businesses through big data. Based on newly researched big data, it has caught the attention of many firms working in supply chain networks (Walls & Barnard, 2020). The benefits of using big data include identifying any firm's critical areas, for example, all arrangements of performance or execution (Anwar et al., 2018).

In this study, we will find the solution to the problem in the supply chain of the Karachi market. As firms need different tools to save money and time, all they need is data for growing their business. In supply chain terms, big data will add exceptional value to collecting the needed and required data. Before a decade, people never knew big data could be a tool for collecting data in less time and money. Now, firms will analyze big data and find their problem solutions through it. Big data can be a tool to gather all human information in one place and complete data attainment. Firms have not yet used tools like this, but now the world is getting technological and statistical data information in one place. Below are the research questions:

Q1: What is the impact of big data on organizational performance?

Q2: What is the impact of supply chain innovations on organizational performance?

1.2 Purpose of the Study

To inquire how big data can improve the organization's performance and how and what the successful factors of big data will be added (Walls & Barnard, 2020). This research measured an organization's performance when Big Data was implemented and checked for new opportunities, competencies, and strategies. Any firm must understand how big data will work in the next few years to develop new strategies and change their business modules. This will help them achieve their goals. Big data strategies will help firms capture their competitive points. This was to examine the relationship between big data and the organization's performance (Shabbir & Gardezi, 2020). In previous years, there was little study on this topic that focused not on how big data can help firms' growth and make them top-notch origins in IT. This research helped with organizational enhancement and the capability to develop new data collection ideas. This can create opportunities for firms to acquire jobs in the whole data collection network and influence their potential.

1.3 Significance of the Study

Significance of any firm's business because big data is growing fast in prosperous areas and

needs to be overcome with competitive advantages. Drive large amounts of information and structured data to access the capacity of interpretation in the informational stage, for some previous research articles have understated the study that there is an urgent need to know how the strategies work (Alsghaier et al., 2017). There needs to be good administration to take suitable measures for large data or informational drives; the firm may suffer competition on its growth journey (Hao et al., 2019). Theoretical research is significant due to being based on big data from other researchers; studies need to find knowledge gaps between capacities and organizational performance, which have many missing links. Opening significant information, the extensive data, helped make the data straightforward. There is an opportunity for firms to digitize their data in transactional form or store or create it. Through big data, firms can be detailed to audit and reach their customer's desirable products. Big data helped improve organization productions and services; they were more employed than before.

1.4 Definitions

1.4.1 Big data

These days, the way of finding or collecting data is growing daily, and for this enormously growing phase, firms and organizations face more challenges. Big data can help with the massive volume of data. In a firm's performance, big data was or can also be a growing factor. There are so many deficiencies in firms' ability to use this terminology effectively that this pattern can create a barrier for organizations to retain their significant benefits. Researchers have explored the importance of big data and how it works in the growth stages of a firm's performance (Anwar et al., 2018). Big data added value to a new business concept and created new opportunities for firms by collecting a large amount of precious data. Big data makes any firm sustainable and may also seek customers' attention. Big data was helpful in decision-making for organizations. This was also helpful in appointing prominent data experts to achieve the goal that had been set by the firm (Fosso Wamba et al., 2018). The study of big data is new for firms; it has to be more explicable in that there is very little research on big data by organizations, which can be very interesting for researchers.

1.4.2 Supply chain innovation

Big data can be a tool for the growth of any business, whether it is a small business, a medium business, or a corporate level. This is especially true when creating innovation in the supply chain field. It can be used for many departments of organizations, as they have an IT department; it can be applied there; it can also be used for sales or marketing strategies to enhance the business area (Google). If firms start using big data strategies, they can see their value in the list of successful firms worldwide. Through this, organizations may reduce the expenses they spend on marketing or the collection of data, which consume a lot of time (Rashid & Rasheed, 2022).

1.4.3 Organizational performance

Organizational performance can be related to identifying its growth in the market; it is also a tool for measuring and analyzing the designed growth stages as per the plan of impartiality, which defines the firm's previous results of growth as well as future benefits (Shabbir & Gardezi, 2020; Baloch & Rashid, 2022). To get a high level of performance, it is connected directly to organizational capacity to catch the market. The organizational performance may help analyze the process of utilizing the firm's resources, which were assigned to the managers of companies, and also help learn whether all tools and activities are being used properly. This study analyzes organizational performance in a growth sense (Iqbal et al., 2018). In the market, many tools are available in software that can be used for extensive data implementation in organizations for better performance, which will also help in business growth. Many examples of big data implementation are available, such as "Amazon," which is all about customer-based recommendations.

2. Literature Review

2.1 Theoretical Review

In this study, the researcher tried to understand the nature of big data for firm performance and all businesses and the climate of enormous information in business. When all organizations require large amounts of data, it helps them achieve their targets to gain profit and sustain firm performance. The world is pursuing intelligent technologies to reduce expenses and do brilliant work. The collection of designed and oriented frameworks helped big data in the public and private sectors (Iqbal et al., 2018; Rashid & Rasheed, 2023). Big data technology has helped to reduce the misuse of informational data; it can be used to inspect illegal records and improve customer satisfaction. Big data improves the performance of organizations by using traditional database systems. After applying big data, there were possibilities to enhance the data set system in organizations, and it was performed faster, more systematically, and more effectively in any business by Bienhaus & Haddud (2018). Big data will be collected from media and websites. All the data was a sign that all the information had been collected helpfully.

2.2 Empirical Review

2.2.1 Big data

Organizations' environmental, social, and economic performance can be improved if big data plays a vital role in it. Integrating big data into firm performance is problematic because it is it takes a lot of work. This paper presents key areas for taking measures for the performance of organizations, identifying important variables in typical organizations' performance, and making a simulation pattern for developing big data roles and strategies when converting from an old pattern of the data collection method. The organization's performance has key variables that it has simulated and analyzed based on system dynamics principles. In the future, the economic and environmental benefits of social performance will be realized by investing in big data. This paper provides a strategy by providing sound insights (Google). Environmentally, improving the big data model plays a vital role in organisations' societal and low-cost performance in the supply chain. However, in absorbing big data on an organisation's performance in the supply chain, the tasks are more complex. The application of big data was measured to identify the formal interconnection between the variables in a typical performance. A dynamic simulation model is needed to develop appropriate big data policies and strategies. When translating from big data to organizational performance (Bienhaus & Haddud, 2018).

2.2.2 Supply Chain Innovation

Big data can improve and enhance business; it has helped innovation in the supply chain and helps organisations satisfy their customers' needs. In other words, big data is all about determining extensive data collection and can be effective for growth. It is also concerned with low costs, firm value, data forecasting, growing production costs, and the organization's physical performance, which explains why big data strategy is now one of SC's most commonly used terms. It indicates that all businesses want to use intelligent techniques to compete with market competitors. The one under-process system of a large volume of data and its implementation should be kept at a level that provides optimum services and at least possible cost (Govindan et al., 2018). Business improvement is essential for a firm's success. Future success and sustainability depend on the system applied and its management. Big data can be applied in transportation, banking, logistic management, procurement, and other aspects of the supply chain. If the implementation of data is not well maintained and planned, a company can experience significant losses and ultimately decline (Alsghaier et al., 2017; Rashid et al., 2024). As before, there is always competition between firm performance and applications of technology to achieve the goal of good performance. While cost includes the opportunity cost or the finance consumed for procuring the data implementation and handling it, In the study, it is said that the benefits of the implementation of big data include system maintenance, the cost expended on it, and getting the maximum profit out of it (Iqbal et al., 2018).

2.2.3 Organizational performance

Big data can be used as an intelligent technique in business; it has low costs and increases performance effectiveness. All of these factors can be used to improve an organization's performance. They will use big data to achieve all their purposeful goals and achievements. There are many steps to collecting information, like social media, websites, and other resources, but companies usually need to be more relevant, unimportant and may be useless data collected. Big data helped them get the information they required. These factors will help the people associated with these systems and help society by enhancing cost-effectiveness and environmental awareness. Big data will help them identify all the data that has been completed and all the necessary information that has been adopted. Applying the big data concept will create ways to achieve designed goals. This paper presents the business performance in a system optimizing the firm's social, economic, and environmental gains. The OP is directly involved in the organization's activities of outcomes and designed profit to gain (Shabbir & Gardezi, 2020; Hashmi et al., 2021a; 2021b).

2.2.4 Big data with organizational performance

Big data is directly linked with all purposes and processes of businesses; it was given an analysis of the depth of organizations' performance. It was helpful to gather all new information to reprocess for business improvement in organizations' performance (Anwar et al., 2018). Any firm can sustain its performance with a big data strategy and compete with its competitors using the latest and most advanced technologies, all with these competitors. Big data was a tool to help the company succeed as it had many competitors in the market. Companies using big data at the right time and with the correct information could survive in a competitor's era. It is a critical and focused department of any firm. If a company spent on its IT, it would grow faster and find good results, as before they did not. All IT-related activities play a remarkable role in an organization's performance. It may also cause revenue and growth for firms, as it can significantly impact them. In a study by Anwar et al. (2018), in big data, successful factors like IT, advanced technologies, the correct data information, and others helped them gain the latest opportunities and get the fastest response to compete in the market.

2.2.5 Supply chain innovation with organizational performance

Big data and innovation in the supply chain can boost the business's strategy and planning process. To be updated, every firm must have the correct information for its primary and daily business activities. Organizations have to install the latest and most updated software to manage and perform in a better way, prepare for market risk, and be on the survival list (Queiroz & Telles, 2018). In order to improve business under the competitor’s big data, the company's value was enhanced. In other studies, big data boosted the performance of firms if they actively used people, automation, and data transformation to find solutions to their business problems (Elgendy & Elragal, 2014). Many firms cannot update their data and keep records of their market and consumers, which may cause them to lose their market and customers' value and expectations. Big data helped solve and overcome database issues and the latest conventional issues, giving them a new mode of business in management and strategic management. This study helped managers explore new opportunities and make customers desirable products and demands (Hashmi et al., 2020a; 2020b). All the factors were described to make a good and positive response to business improvement capabilities personally will also come up with positivity.

2.3 Theoretical Model

To decide everything, the need to scale, measure, and explain the particular point of view needs a theoretical model to help research. The researcher gets an analytical analysis of the interpretation of the data to be gathered. In this research, we had an idea framework that has a conceptual impact on organizational performance through big data concepts and the application of its strategies. Always, the research has two major variables, which have one independent and the other one is dependent. The figure has shown.

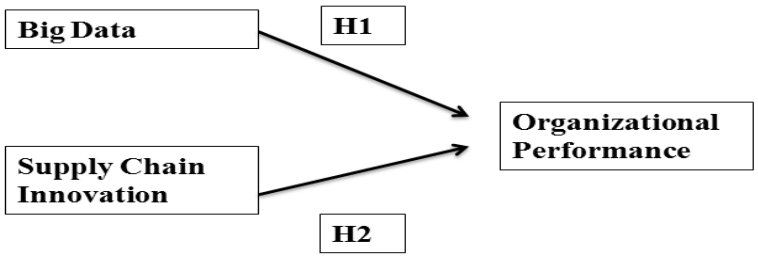

Figure 1: Theoretical framework
Source: Author's creation

2.4 Hypotheses

H1: Big data has a significant outcome on organizational performance.

H2: Supply chain innovation has significant outcomes on organizational performance.

3. Research Method

3.1. Research Approach

This research has a quantitative approach (Rasheed & Rashid, 2023). This study helped to understand the truths and facts of regular business growth and make relations between them to focus on different points and their importance in the supply chain through big data analysis to determine the significant effects on organizations' performance (Haq et al., 2023). Many methodologies are available, and they were considered precedent business models (Bienhaus & Haddud, 2018; Rashid et al., 2020). Numeral, reasoning, and discussed statistical data. This depended on the number of exchanged numerical details. The researcher used this approach, which was more technical, research-based, quick, and acceptable because the researcher has to collect, examine, and then go for hypothesis testing, which will evolve from analytical results (Khan et al., 2021; 2022). This research was based on exploratory research because this type of research has been used to examine problems that have yet to be analyzed and have never been examined before in past research (Rasheed et al., 2023). This research focused on examining the impact of big data on Karachi's supply chain market. This research will focus on these forms of primary and secondary data. The literature review is secondary data that has been collected, and the primary data will be gathered from a look-over and observed questionnaire. This study focused on the impact of big data in the supply chain market through business improvement and successful factors on organizational performance (Khan et al., 2023a; 2023b). This research selected this design to examine the impact of independent and dependent variables along with questionnaire observation (Rashid & Rasheed, 2024).

3.2 Sampling Design

3.2.1 Target population

This study targeted the market of Karachi, like those firms that have direct connections with the supply chain and their allies. The study analyzed how the data will be gathered in Karachi firms and how they can be implemented (Alrazehi et al., 2021; Agha et al., 2021; Haque et al., 2021). After the implementation, we saw the result in the form of profit, or it could be in the form of their achieving goals.

3.2.2 Sample techniques

We have a chance for equal selection in probability sampling, so random sampling was used (Rashid et al., 2021).

3.2.3 Sample size

The researcher used a sample size of 140 in this research. The pick-out owners of businesses, managers experienced in the supply field, and other people who will be relevant and give responses on the impact of big data on the supply chain for organizations' performance. The questionnaire was distributed and collected moderately (Das et al., 2021; Shabbir & Gardezi, 2020; Rashid et al., 2022b).

3.3 Instrument of Data Collection

Recent research has focused on implementing big data in the supply chain, incorporating the successful factors of big data and business improvement. The dependability of questionnaires was checked by Cronbach's alpha, which is a factor that confirms any study's dependability. 0.7 is the minorest significance allowed by Cronbach's alpha (Hashmi & Mohd, 2020). Questionnaire reliability was measured in this research by the collection of data. This study used a questionnaire based on Likert scale analysis because it is easy to understand. The significant data components are calculated for the following:

3.3.1 Big data

To assess this component, we used a five-item instrument for measurement. It has been proven to be reliable and logical with ample study. This uses a Likert scale with the following categorization: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

3.3.2 Supply chain innovation

To assess this component, we used a five-item instrument for measurement. It has been proven to be reliable and logical with ample study. This uses a Likert scale with the following categorization: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

3.3.3 Organizational performance

To assess this component, we are using a five-item instrument for measurement. It has been proven to be reliable and logical with ample study. This uses a Likert scale with the following categorization: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

3.4 Procedure for Data Collection

The first step was to make a questionnaire of more than ten questions. I then sent that questionnaire to all of my fellow students and friends to collect their responses, and I tried to visit some of the organizations that were working on big data to improve the performance of their organizations. After these steps, I started working on my future analysis.

3.5 Statistical Technique

Regressions, reliability, and descriptive analysis will be used as the statistics techniques. For checking and analyzing the internal consistency of the elements or questions, Cronbach’s alpha is a method that includes a questionnaire and determines the relationship between components in the questionnaire. We used Cronbach's alpha to test the reliability of the questionnaire (Rashid et al., 2019). Regression is a tool used to determine the predictor and outcome between variables. This study used this model on dependent variables of organizational performance and independent variables of big data

and supply chain innovation (Rashid & Amirah, 2017).

4. Results

4.1 Validity and Reliability Test

To confirm the reliability, a validity and reliability test was used to find out the Cronbach's alpha value of the tools, which were all used to collect responses (Rashid, 2016).

Table 1: Reliability Test

Cronbach's Alpha	N of Items
.795	15

You can see in Table 1 above that the value of Cronbach's Alpha is more than 7. So, the scale and data are reliable, so we can analyze the analysis more (Hashmi, 2022).

4.2 Findings and Interpretation of the Results

The following results were obtained after analysis and execution on SPSS.

Table 2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OP1	138	1.00	5.00	3.8406	.80370	.646	-1.671	.206	4.239	.410
OP2	138	1.00	5.00	3.9783	.79659	.635	-.752	.206	.992	.410
OP3	138	1.00	5.00	3.8333	.89266	.797	-.477	.206	-.134	.410
OP4	138	2.00	5.00	3.9710	.94322	.890	-.683	.206	-.365	.410
BD1	138	1.00	5.00	4.0290	.86237	.744	-1.096	.206	1.628	.410
BD2	138	1.00	5.00	3.6957	.89286	.797	-.732	.206	.370	.410
BD3	138	1.00	5.00	3.7681	.86531	.749	-.491	.206	.044	.410
BD4	138	2.00	5.00	4.0000	.88787	.788	-.825	.206	.173	.410
SCI1	138	1.00	5.00	4.0145	.95890	.919	-1.138	.206	1.170	.410
SCI2	138	1.00	5.00	3.7536	.80882	.654	-.696	.206	.637	.410
SCI3	138	2.00	5.00	3.9130	.79669	.635	-.809	.206	.659	.410
SCI4	138	1.00	5.00	4.1232	.88337	.780	-1.276	.206	2.215	.410
OP	138	1.50	5.00	3.9058	.52423	.275	-.853	.206	2.331	.410
BD	138	2.00	5.00	3.8732	.56450	.319	-.739	.206	1.109	.410
SCI	138	2.00	5.00	3.9511	.54107	.293	-1.322	.206	2.821	.410
Valid N (listwise)	138									

Table 2 shows the total number of participants, which is 138. I did take 140 participants, but I had to remove two outliers to set my data; this shows a range from 1, the minimum value is 2, and the maximum value is 5 (Rashid et al., 2021; Hashmi, 2023).

Table 3: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.402[a]	.162	.149	.48355	1.780

a. Predictors: (Constant), SCI (Supply Chain Innovation), BD (Big Data)
b. Dependent Variable: OP (Organizational Performance)

The proportion of variance in the dependent variable is R square (organizational performance). It may be predicted from the Independent variable (Big Data and Supply Chain Innovation). The model of this in Table 3 shows the results of 16.2% of the variance.

Table 4: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.085	2	3.042	13.012	.000[b]
	Residual	31.566	135	.234		
	Total	37.650	137			

a. Dependent Variable: OP
b. Predictors: (Constant), SCI, BD

The value of ANOVAa in Table 4 shows significance, which is less than .05; this model is significant, and the value of F is 13.012, which shows the significance of IV (Rashid et al., 2021).

Table 5: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.144	.350		6.132	.000		
	BD	.241	.081	.259	2.981	.003	.821	1.218
	SCI	.210	.084	.216	2.489	.014	.821	1.218

a. Dependent Variable: OP (Organizational Performance)

In the above Table 5 models, the T values are more than 2, so we can call all values significant; the value of P is less than 5, showing a significant impact on the independent variable on the dependent variable. The model shows that a 1% increase in Big Data can increase organizational performance by 25.9%, and a 1% increase in Supply Chain Innovation can increase Organizational Performance by 21.6%.

4.3 Research Hypothesis Summary

The findings of the study, Big Data and Supply Chain Innovation have a considerable and significant impact on organizational performance.

Table 6: Hypothesis Summary

H	Hypothesis	Empirical conclusion
H1	Big Data's significant effects on organizational performance	Accept
H2	It has significant relationship between Supply Chain Innovation and organizational performance	Accept

5. Discussion, Conclusion, Implication and Future Research

5.1 Discussion

Based on the study, I feel that organizations should try to analyze big data and supply chain innovation. Organizations should try to understand the nature of big data for firm performance and all businesses, which will help them achieve their targets in order to gain profit and sustainability and make supply chain innovation for firm performance. Big data was helped in the public and private sectors by the collection of designed and oriented frameworks (Iqbal et al., 2018). The objective of this research is The use of big data to identify new products and polish old product strategies. Big data has a lot of benefits. For: organizations may produce more products that are connected to consumers as the big data indicates the firm's needs; it can be helpful in identifying the needs of customers; it can minimize the risk of the market; and it can be used to develop or launch a new product in the market associated with it. With a big data strategy, organizations can cut costs and improve their pricing as well. It should increase the loyalty of customers to the firm as well as increase sales. The implication of big data is that it can measure key performance and identify the connection between the variables on the basis of performance. The application of big data is to explore market opportunities and notify people of their needs and those of consumers. The terminology of big data in supply chain innovation has to be common for any organization, whether it be for medium or small enterprises. Making appropriate policies based on big data can be a dynamic model. The translation from big data can be a tool to increase supply chain

innovation strategies and organizational performance as well (Bienhaus & Haddud, 2018).

5.2 Conclusion

The motive of this research was to analyze and investigate how big data affected organizational performance in Karachi's supply chain market and also analyze the effect of big data and supply chain innovation on organizational performance. The independent variables I used were big data and supply chain innovation for organizational performance. In this study, the two hypotheses, H1 and H2, were created. To test the hypotheses, we conducted some tests on SPSS, such as reliability, regression, correlation, and descriptive. This research was performed in Karachi with a sample size of 140, and both hypotheses were accepted. In the first hypothesis, the result shows that the impact of big data on organizational performance is positive. This study is also stated to have been conducted in Jordan and Islamabad universities as a positive impact of big data on organizational performance (Alsghaier et al., 2017); the 2nd hypothesis result shows a positive relationship between organizational performance and supply chain innovation. This study shows a significant impact on supply chain innovation and organizational performance (Anwar et al., 2018). The study focused on that denomination in the supply chain and big data on organizational performance in the market for supply. Big data can be a tool to enhance the growth of enterprises and sectors of the supply chain, and supply chain innovation would be a new change in the market. Big data is a fine tool for finding the targeted and suitable market. We can also find our customers through big data. Supply chain innovation is necessary for new markets to update our strategies and plans of implementation for growth and achievement of goals because customers are always happy with their desired products consumed. So, this study tells us that there is a positive relationship between big data and supply chain innovation and organizational performance.

5.3 Implications

This study has shown that there is a positive relationship between big data and supply chain innovation and organizational performance. Theoretical implications: For managers, this research will be very helpful in growing their sector's business and performance in the market, identifying customers through big data, and improving supply chain innovation in supply chain values and practices. Authorized implications: Supply chain sectors and organizations can adopt this study to improve their businesses and plans. This research was conducted to identify the impact of OP through big data and supply chain innovation in Karachi. This study will be helpful for supply chain managers and supply chain sectors. This research is helpful for future researchers and students who want to study big data and organizational performance.

5.4 Future Research

For future recommendations of this research, considering that this research was conducted in Karachi, it should be conducted in other cities in Pakistan. For future students, they can expand the sample size, as in this study, the sample size was 140. On the other hand, for researchers, a future recommendation is that research should use other variables like applications of big data analyses, competitive advantages in the supply chain, and decision-making. For future investigations, the model for supply chain outcomes and organizational performance will be examined. It is possible for the research industries to be changed in the future.

5.5 Limitations

This research was conducted in Karachi only, and it was also limited to the city of Karachi. We all have an idea that the culture and people's practices may differ from country to country and city to city. That's why this research was limited. To collect the data, the tool is survey-based, which is not comfortable for the respondent to give an answer accurately, or maybe they have no idea or awareness of that particular subject. The sample size was also limited, as it was just 140.

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