Journal of Supply Chain Management Systems
10 (3) 2021, 51-61
http://publishingindia.com/jscms/

Envisioning Supply Chain Recovery Post-COVID-19 across Industries

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Abstract

This study investigates whether supply chain recovery challenges post-COVID-19 found in different research papers are different in significance depending on the industries, and the perception of supply chain managers of different industries of Bangladesh. A two-phased investigation was carried out. Phase 1 involved reviewing the latest relevant literature; and in Phase 2, questionnaires were administered to elicit responses from supply chain managers and executives. The sample of 48 respondents was developed using the judgement sampling and the snowball approach, with a response rate of 48 per cent. In total, 16 supply chain recovery challenges were used to develop the instrument. To examine the obtained data, descriptive statistics and a Kruskal—Wallis test were used; for factors maintained at or below 0.05, a family-wise Bonferroni adjustment (Mann—Whitney U test) was used. Most of the mentioned recovery challenges are found to be significant by the industry experts (supply chain managers and executives). However, there exist disparities in the ranking of perceived importance of one supply chain recovery challenge among different industries. This study could be a basis for future studies and would help businesses to focus on recovery priority areas post-COVID-19 era. Moreover, the study opens an avenue for further research in this field to come up with plans to bolster the recovery from specific disruptive challenges to ensure supply chain resilience.

Keywords: Supply Chain Recovery Challenges, COVID-19, Bangladesh

Introduction

Supply chain recovery is fundamental to supply chain disaster management and resilience. Supply chains usually experience many challenges when formulating strategies for recovering from the impacts of disruptions (Duhadway et al., 2017). Depending on the intensity of the occurrence, the scope of the issues vary(s). Firms, for example, may face greater difficulties recovering from significant outbreaks such as epidemics or pandemics. This is due to the fact that such outbreaks have significant and long-term consequences for organizations and operations, necessitating more comprehensive recovery plans (Koonin, 2020).

The current supply chain problem may be temporary, but as climate change and other disruptions take hold, instability may become a permanent aspect of global trade. Part of the solution is digital transformation, but it is even more critical that we bring about a paradigm shift in how we think about international trade (*Will Global Supply Chain Issues Disrupt the Economic Recovery? | World Economic Forum*, n.d.).

Identifying potential supply chain recovery obstacles and their impact on post-disaster recovery is therefore critical during a significant epidemic to ensure supply chains create the proper plans to overcome such issues (Choi, 2020; Koonin, 2020). Like many other previous disasters, the COVID-19 situation has presented supply chain management with a new set of challenges (Odunayo & Victor, 2020). Finance, lead time, customer, and production performance have all suffered significant setbacks. Effective recovery management solutions are required to offset the effects of COVID-19 on supply chains (Paul et al., 2021).

Purpose and Problem Statement

This paper is a preliminary attempt to sought out the most significant recovery supply chain challenges to attain and maintain financial efficiency, efficacy and thus achieve

and sustain competitive advantage during the post-COVID-19 era in Bangladesh.

The study seeks to unearth whether:

- The perceived likely supply chain challenges due to disruptions caused by COVID-19 has varied significance within the different industries (namely: RMG, Textile, Pharmaceuticals, Food and Beverage, Manufacturing, Service) in Bangladesh.
- The ranking of perceived likely supply chain challenges due to disruptions caused by COVID-19 according to the supply chain experts (supply chain managers and executives).

Literature Review

The COVID-19 epidemic has wreaked havoc on global supply networks and highlighted weak connections in them in ways that most people have never seen before. The pandemic's degree of disruption affects every nation and industry, and the quick and dramatic shifts in demand and supply that occurred during the pandemic clearly distinguishe its impact from that of past crises (Dubey, Bryde, Blome & Roubaud, 2021). Scholars have been investigating and releasing their studies on the numerous supply-chain challenges posed by COVID-19 since the pandemic began (Chowdhury et al., 2021). Whereas, some studies tried to identify the disruption/recovery challenges faced during the COVID-19 (e.g. Duhadway et al., 2017; Paul et al., 2021; Remko, 2020), some other tried to shed light on the extant literature on impact of epidemic outbreaks on supply chains (e.g. Choudhury et al., 2020; Karmaker et al., 2020; Queiroz et al., 2020). Moreover, some studies tried to develop a framework for resilient global value chain post-pandemic recovery (e.g. Choi, 2020; Fu, 2020; Sharma et al., 2020).

The basic literature for supply chain disruption recovery during and after COVID-19 is examined in this section (see Table 1).

Supply Chain Interruption and Recovery Challenges

Supply chain interruption management especially in times of contingency has become an increasingly important topic in academic research. To reduce the total impact of disruptions on operations, proper formulation of recovery strategies for handling disturbances is required (Bo et al., 2021). After a disaster, developing recovery techniques to restore to normal or superior operating levels is critical to quick recovery and survival (Ouabouch, 2020). Companies face many challenges in formulating supply chain recovery strategies. COVID-19 has had a long-term impact on economies and communities, and it now poses a threat and a question about the resiliency of SCs in all industries (Sharma et al., 2020).

Many companies are capable of quickly mobilizing and establishing crisis-management procedures, ideally in the form of a nerve centre. Typically, the focus is on the near term. How can supply-chain leaders plan for the medium and long term while simultaneously building the resilience they'll need to get through it (Alicke et al., 2020)?

Demand–supply disruptions are affecting global supply chains (GSCs) all over the world. Coronavirus outbreaks have had a significant impact on global and local economies, and supply availability has been restricted and misbalanced in response to increased demand for basic products (Sharma et al., 2020). In the face of multi-country disruptions, supply networks lack global resilience and are breaking down. Besides, Supply chain and operations are growing more expensive (e.g. less global and e-commerce fulfillment expenses) and can sometimes be the greatest costs for a company. Moreover, Talent shortages in the supply chain and operations continue to place a heavy reliance on human labour. In addition to that, the inability to meet client requests for personalization and customization is hampered by a lack of flexibility (Supply Chain Disruption & How to Respond | Accenture, n.d.).

Table 1: Recovery Challenges

Ranking	Supply Chain Recovery Challenge ID	Name of the Supply Chain Recovery Challenge	Source
12	SCR1	Likely global economic recession in the longer term	Paul et al. (2021)
2	SCR2	Pressure from buyers on reducing delivery lead time	Paul et al. (2021)
6	SCR3	Pressure from buyers on using a faster transportation mode	Paul et al. (2021)
15	SCR4	Increase of Bankruptcy of supply chain partners	Paul et al. (2021)
10	SCR5	Payment withholding from buyers	Paul et al. (2021)

Ranking	Supply Chain Recovery Challenge ID	Name of the Supply Chain Recovery Challenge	Source
16	SCR6	Frequent order cancellations from the buyers	Paul et al. (2021)
4	SCR7	Complexities in real-time forecasting of customer demand	Kumar et al. (2020) Paul et al. (2021)
7	SCR8	Long-lasting impact on the activities of end customers	Kumar et al. (2020); Paul et al. (2021)
11	SCR9	Sharp fall in demand for a longer period	Paul et al. (2021)
3	SCR10	Shortage of physical and financial resources	Kumar et al. (2020); Paul et al. (2021)
8	SCR11	Low level of financial flow in the market	Paul et al. (2021)
1	SCR12	Increase in the prices of raw materials	Paul et al. (2021)
9	SCR13	Changes in the distribution network	Kumar et al. (2020); Paul et al. (2021)
5	SCR14	Dilemma of 'Survival vs. sustainability' in making the decision	Paul et al. (2021)
13	SCR15	Lack of supply chain flexibility	Kumar et al. (2020); Paul et al. (2021)
14	SCR16	Lack of trust between organization and supply chain partners	Kumar et al. (2020)

Hypothesis

H_0 = There are no significant differences between the perceived likely supply chain challenges due to disruptions caused by COVID-19 according to the supply chain experts (supply chain managers and executives).

H_1 = There are significant differences between the perceived likely supply chain challenges due to disruptions caused by COVID-19 according to the supply chain experts (supply chain managers and executives).

Research Methods

Research Design

The acquired data were analyzed using descriptive and inferential statistics.

Population of the Study

The population of the study comprises the supply chain experts (managers/executives) of different industries (namely: RMG, Textile, Pharmaceuticals, Food and Beverage, Manufacturing, Service) in Bangladesh (see Table 2).

Sampling Procedure

In total, six sectors of the economy (RMG, Textile, Pharmaceuticals, Food and Beverage, Manufacturing, and Service) from the city of Dhaka in Bangladesh were selected using judgement sampling, also known as purposive sampling (researchers used their knowledge and professional judgement to select the respondents). Furthermore, the snowball technique was utilized to create a sample of 48 supply chain managers and executives with a response rate of 48 per cent.

Participants

Through an exhaustive literature review, the first step of the study was designed to validate the expected recovery challenges. With the goal of collecting, organizing, and synthesizing current knowledge addressing supply chain interruption and recovery problems, relevant papers are discovered using a systematic web search. This stage is usually accomplished by focusing on well-known journals and conferences. This is not the case in this study because the phenomena only began two years ago and relevant publication channels are still fragmented. Today, the most common approach of locating the most relevant documents is to use search queries in internet databases. As a result, few major online databases were targeted as following for the past two years: Scopus (Elsevier), Web of Science (Thomson Reuter), and ScienceDirect (Elsevier). The notion of supply chain recovery difficulties is still in its early stages of research and development among academics, according to this search, but it is well known and debated among practitioners.

We review and categorize relevant research in order to acquire understanding into SCRC in this study. Books, peer and non-peer-reviewed articles, industry reports, and white papers are among the literary sources explored in scientific databases and conventional search engines. The keywords were not chosen in advance of the search, but they arose over time as a result of the significant reading that took place while preparing this study. Because of the fragmented structure, Google Scholar search engine queries are used to search large databases using a non-exhaustive keyword list.

In the second phase, the questionnaires were mailed to 100 supply chain experts (supply chain managers and executives) from whom 48 individuals from different organizations participated. From the responses, it can be found that, all of the respondents were between the ages of 30 and 55. In the industry breakdown, 37.5 per cent of the respondents work at RMGs, 20.8 per cent work at service delivery organizations, 16.7 per cent at Food and Beverage industry, 12.5 at other Manufacturing industries, 8.3 per cent at Pharmaceuticals, and 4.2 at Textiles (see Table 2).

Table 2: Demographic Information of the Sample

Category	Sub-Category	Respondent	
		N = 48	%
Gender	Male	40	83.33
	Female	8	16.67
Organization	RMG	18	37.5
	Textiles	2	4.2
	Pharmaceuticals	4	8.3
	Food and Beverage	8	16.7
	Manufacturing	6	12.5
	Service	10	20.8
Working experience	Less than 1 year	8	16.67
	1—5 years	18	37.5
	5—10 years	12	25
	More than 10 years	10	20.83

Development of Questionnaire

The questionnaire was created following a thorough examination of the literature (e.g. Choudhury et al., 2020, 2021; Paul et al., 2021; Robles et al., 2021). Prior to distribution, the questionnaire was piloted by showing it to a group of academic scholars. The questionnaires were mailed to supply specialists from various industries after many modifications and validations.

Instrument

The supply chain experts (supply chain managers and executives) were asked to rate on a scale of 5 (extremely important) to 1 (extremely unimportant), the extent to which they perceive the challenges will be significant in the recovery period of their particular industries.

Statistical Treatment of Data

The statistical tool SPSS was used to handle and analyze the data. The Kruskal–Wallis test was used to evaluate the hypothesis by calculating statistical significance and comparing six groups.

The Kruskal–Wallis test formula is as follows:

$$H = \frac{12}{N(N+1)}\left(\frac{R_1^2}{n_1} + \frac{R_2^2}{n_2} + \cdots + \frac{R_k^2}{n_k}\right) - 3(N+1),$$

where, R_1 = Sum of ranks of Sample 1,

n_1 = Size of sample 1,

R_2 = Sum of Ranks of Sample 2,

n_2 = Size of sample 1,

R_k = Sum of ranks of Sample k,

n_k = Size of sample k,

$N = n_1 + n_2 + \ldots\ldots + n_k$, and

K = Number of samples,

where stayed at or below 0.05, a family-wise bonferoni (Mann–Whitney U test) were conducted to determine the exact differences between the samples.

Results

Summary of Supply Chain Experts of Different Industries' Perceptions

The ranking (see Table 4) indicates that "Increase in the prices of Raw materials (SCR12)" is the most prominent concern of the experts in all industries. It implies that the most crucial recovery challenge due to the impacts of the COVID-19 pandemic in different industries would be a "Increase in the prices of Raw materials".

Apart from SCR12, the next five most essential recovery challenges are "Pressure from buyers on reducing delivery lead time (SCR2)," "Shortage of Physical and Financial Resources (SCR10)," "Complexities in real-time forecasting of customer demand (SCR7)," "Dilemma of 'Survival vs. sustainability' in making decision (SCR14)," and "Pressure from buyers on using faster transportation mode (SCR3)."

The next five key recovery challenges are "Long lasting impact on the activities of end customers (SCR8)", "Low level of Financial Flow in the market (SCR11)", "Changes in distribution network (SCR9)" "Payment withholding from buyers (SCR5)", and "Sharp fall of demand for a longer period (SCR9)" .

The remaining important recovery challenges are "Likely global economic recession in longer term (SCR1), "Lack of supply chain flexibility (SCR15)", "Lack of trust between organization and supply chain partners (SCR16)", "Increase of Bankruptcy of supply chain partners (SCR4)," and "Frequent order cancellation from the buyers (SCR6)."

Table 3: Total Responses' Rating: Supply Chain Managers and Executives

Skills	Mean	Standard Error of Mean	N	% of Total *N*
SCR1				
1	2.67	1.667	3	6.3%
2	3.20	1.158	5	10.4%
3	2.64	0.560	11	22.9%
4	4.12	0.428	17	35.4%
5	2.75	0.579	12	25.0%
SCR2				
1	1.00	0.000	2	4.2%
2	4.75	1.250	4	8.3%
3	2.88	0.693	8	16.7%
4	4.18	0.644	11	22.9%
5	2.87	0.368	23	47.9%
SCR3				
1	2.67	1.667	3	6.3%
2	3.20	1.020	5	10.4%
3	4.50	0.764	6	12.5%
4	3.13	0.499	16	33.3%
5	3.06	0.468	18	37.5%
SCR4				
1	2.00	1.000	2	4.2%
2	3.13	0.833	8	16.7%
3	3.94	0.433	17	35.4%
4	2.83	0.601	12	25.0%
5	2.89	0.735	9	18.8%
SCR5				
1	2.25	1.250	4	8.3%
2	4.33	1.667	3	6.3%
3	3.90	0.605	10	20.8%
4	3.33	0.513	15	31.3%
5	2.81	0.476	16	33.3%
SCR6				
1	2.83	1.014	6	12.5%
2	4.00	0.707	8	16.7%
3	3.27	0.506	11	22.9%
4	3.08	0.679	12	25.0%
5	3.09	0.595	11	22.9%
SCR7				
1	6.00	0	1	2.1%
2	2.50	1.190	4	8.3%
3	3.36	0.622	11	22.9%
4	3.27	0.702	11	22.9%
5	3.19	0.406	21	43.8%

Skills	Mean	Standard Error of Mean	N	% of Total *N*
SCR8				
1	6.00	0	1	2.1%
2	4.00	1.528	3	6.3%
3	2.92	0.657	12	25.0%
4	2.89	0.464	18	37.5%
5	3.64	0.476	14	29.2%
SCR9				
1	6.00	0.000	2	4.2%
2	3.80	1.158	5	10.4%
3	2.60	0.670	10	20.8%
4	3.85	0.372	20	41.7%
5	2.00	0.505	11	22.9%
SCR10				
1	6.00	0	1	2.1%
2	2.50	0.847	6	12.5%
3	2.25	1.250	4	8.3%
4	3.74	0.411	19	39.6%
5	3.06	0.495	18	37.5%
SCR11				
1	6.00	0	1	2.1%
2	2.29	0.747	7	14.6%
3	2.33	0.615	6	12.5%
4	3.94	0.482	18	37.5%
5	3.06	0.496	16	33.3%
SCR12				
1	4.00	1.225	4	8.3%
2	1.00	0.000	2	4.2%
3	1.00	0.000	4	8.3%
4	3.91	0.719	11	22.9%
5	3.37	0.338	27	56.3%
SCR13				
1	3.50	2.500	2	4.2%
2	3.00	0.886	8	16.7%
3	4.14	0.634	7	14.6%
4	3.62	0.583	13	27.1%
5	2.72	0.419	18	37.5%
SCR14				
1	6.00	0	1	2.1%
2	2.50	0.957	6	12.5%
3	3.89	0.716	9	18.8%
4	3.50	0.511	14	29.2%
5	2.83	0.452	18	37.5%
SCR15				
1	2.67	1.667	3	6.3%
2	3.38	0.905	8	16.7%
3	3.91	0.476	11	22.9%
4	2.44	0.580	9	18.8%
5	3.29	0.506	17	35.4%
SCR16				
1	3.50	2.500	2	4.2%
2	5.00	0.436	7	14.6%
3	3.15	0.587	13	27.1%
4	2.60	0.496	15	31.3%
5	3.09	0.595	11	22.9%

Table 4: Kruskal–Wallis Test

Recovery Challenges	Mean	χ^2	Df	Asymptotic Significance
SCR1	3.63	4.249	5	0.514
SCR2	4.02	5.801	5	0.326
SCR3	3.85	1.704	5	0.888
SCR4	3.38	1.219	5	0.943
SCR5	3.75	6.732	5	0.241
SCR6	3.29	1.592	5	0.902
SCR7	3.98	3.353	5	0.646
SCR8	3.85	5.210	5	0.391
SCR9	3.69	6.634	5	0.249
SCR10	3.98	2.026	5	0.846
SCR11	3.85	0.816	5	0.976
SCR12	4.15	11.306	5	0.046
SCR13	3.77	5.967	5	0.309
SCR14	3.88	4.108	5	0.534
SCR15	3.60	1.155	5	0.949
SCR16	3.54	4.258	5	0.513

Testing of Hypothesis

Kruskal–Wallis is a rank-based, non-parametric (Hong & Lee, 2014), which is an alternative to one-way analysis of variance (Tanner, 2014). It is a Mann–Whitney U test extension (Gooch, 2011) that permits more than two independent groups to be compared. In this study, to see if there were any significant differences in Challenge ratings between supply chain professionals from different industries, Kruskal–Wallis tests were used. A family-wise Bonferroni adjustment was applied, for each recovery challenge category that retained α at or below 0.05.

The results (see Table 4) revealed that for most of the supply chain recovery challenges there are no significant differences in perceived concern among the supply chain experts, including SCR1 (α = 0.514), SCR2 (α = 0.326), SCR3 (α = 0.888), SCR4 (α = 0.943), SCR5 (α = 0.241), SCR6 (α = 0.902), SCR7 (α = 0.646), SCR8 (α = 0.391), SCR9 (α = 0.249), SCR10 (α = 0.846), SCR11 (α = 0.976), SCR13 (α = 0.309), SCR14 (α = 0.534), SCR15 (α = 0.949), and SCR16 (α = 0.513).

Therefore, the null hypothesis is accepted for these particular supply chain recovery challenges, such that there are no significant differences between the perceived likely supply chain challenges due to disruptions caused by COVID-19 according to the supply chain experts (supply chain managers and executives).

The only difference was found between the supply chain experts in perceived concern regarding "Increase in the prices of Raw materials", whereas a minor variation (α = 0.037) was found (χ^2 (5) = 11.306, p < 0.046).

Table 5: Mann–Whitney

Category	Organization	N	Mann–Whitney U	Asymptotic Significance (2-Tailed)	Exact Sig. [2*(1-Tailed Sig.)]
SCR12	RMGs Textiles	18 12	7.000	0.143	0.211[b]
	Textiles Pharmaceuticals	2 4	3.000	0.480	0.800[b]
	Pharmaceuticals Food and Beverages	4 8	13.500	0.514	0.683[b]
	Food and Beverages Manufacturing	8 6	23.000	0.832	0.950[b]
	Manufacturing Service	6 10	13.000	0.042	0.073[b]
	RMGs Pharmaceuticals	18 4	28.000	0.471	0.538[b]
	RMGs Food and Beverages	18 8	33.500	0.019	0.030[b]
	RMGs Manufacturing	18 6	26.500	0.048	0.066[b]

Category	Organization	N	Mann–Whitney U	Asymptotic Significance (2-Tailed)	Exact Sig. [2*(1-Tailed Sig.)]
	RMGs Service	18 10	89.500	0.980	0.981[b]
	Textiles Food and Beverages	2 8	7.000	0.617	0.889[b]
	Textiles Services	2 10	3.000	0.104	0.182[b]
	Pharmaceuticals Manufacturing	4 6	10.500	0.648	0.762[b]
	Pharmaceuticals Service	4 10	13.500	0.324	0.374[b]
	Food and Beverages Service	8 10	16.000	0.017	0.034[b]

The Mann–Whitney U test is a non-parametric test that is similar to the independent sample *t*-test and is used to see if two independent groups have different dependent variables (Gilchrist & Samuels, 2015). Here, *P*-value is the asymptotic significance. If the *P*-value >0.05, in most cases, we come to the conclusion that our differences are not statistically significant. When the sample size is smaller than 40, the exact significance column is created automatically.

Here, perception differences are found (see Table 5) among different industries regarding perception about the possibility of raising raw material price between manufacturing and service (α = 0.042), between RMGs and Food and Beverages (α = 0.019), RMGs and Manufacturing (α = 0.048), Food and Beverages and services (α = 0.017).

Table 6: Mean Ranking of the Challenges by Supply Chain Managers and Executives

Skill Attributes	Organization					
	RMG	Textile	Pharmaceuticals	Food and Beverage	Manufacturing	Service
SCR1						
N	18	2	4	8	6	10
Mean Rank	23.61	10.00	28.13	29.94	25.67	22.50
SCR2						
N	18	2	4	8	6	10
Mean Rank	24.00	23.75	30.38	31.56	24.08	17.80
SCR3						
N	18	2	4	8	6	10
Mean Rank	24.39	31.00	26.88	27.50	21.75	21.70
SCR4						
N	18	2	4	8	6	10
Mean Rank	25.64	31.50	24.50	21.06	23.50	24.40
SCR5						
N	18	2	4	8	6	10
Mean Rank	24.83	32.75	26.50	23.81	33.25	16.75
SCR6						
N	18	2	4	8	6	10
Mean Rank	25.14	23.25	28.63	21.94	28.33	21.70
SCR7						

Skill Attributes	Organization					
	RMG	**Textile**	**Pharmaceuticals**	**Food and Beverage**	**Manufacturing**	**Service**
N	18	2	4	8	6	10
Mean Rank	23.72	20.75	27.25	31.25	23.67	20.65
SCR8						
N	18	2	4	8	6	10
Mean Rank	21.92	26.00	29.50	31.63	27.25	19.50
SCR9						
N	18	2	4	8	6	10
Mean Rank	26.03	35.25	31.38	27.56	18.75	17.85
SCR10						
N	18	2	4	8	6	10
Mean Rank	24.56	22.00	21.00	25.88	30.25	21.75
SCR11						
N	18	2	4	8	6	10
Mean Rank	23.06	22.75	29.00	24.56	26.33	24.50
SCR12						
N	18	2	4	8	6	10
Mean Rank	19.81	35.00	26.88	32.63	31.83	19.00
SCR13						
N	18	2	4	8	6	10
Mean Rank	25.19	23.00	25.38	32.44	24.17	17.05
SCR14						
N	18	2	4	8	6	10
Mean Rank	25.11	25.75	24.63	31.50	21.83	19.10
SCR15						
N	18	2	4	8	6	10
Mean Rank	23.67	28.50	28.50	26.50	24.75	21.85
SCR16						
N	18	2	4	8	6	10
Mean Rank	27.42	29.50	23.75	25.13	26.17	17.05

Managerial Implications

Both COVID-19 lockdowns and, more recently, the pace of the economic recovery have had a negative influence on modern supply chains. However, the pandemic has had a variety of effects in different industries and regions. In general, four factors influence the severity of pandemic shock in various industries and nations. These are the industry's contact intensity, the GVC's degree of fragmentation, the company and country's degree of digitalization, and a country's quarantine measures (Fu, 2020). The practical significance of this study is to assist various industries in recognizing potential recovery challenges that should be considered in order to develop their businesses more resilient not only during the recovery period, but also to survive future catastrophic situations similar to the current one. Despite the fact that multiple studies are being conducted to assess the expected recovery obstacles for businesses, there are insufficient findings that address any disparities within industries and viable solutions.

Limitation of the Study

There are several constraints in the present study. The minimal number of responded (48), for example,

restricts the generalizability of the findings. Moreover, we administered the survey in only Dhaka City of Bangladesh. The future study might include all the cities and more respondents for drawing the causal inference on the result.

Conclusions

The COVID-19 situation has presented supply chain management with a new set of challenges like increase in the prices of raw materials, pressure from buyers on reducing delivery lead time, shortage of physical and financial resources, complexities in real-time forecasting of customer demand, dilemma of survival vs. sustainability, pressure from buyers on using faster transportation mode, long-lasting impact on the activities of end customers, low level of financial flow in the market, changes in distribution network, payment withholding from buyers, sharp fall of demand for a longer period, likely global economic recession in longer term, lack of supply chain flexibility, lack of trust between organization and supply chain partners, increase of Bankruptcy of supply chain partners, frequent order cancellation from the buyers. Effective recovery management solutions are required to offset the effects of COVID-19 on supply chains.

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