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Effect of Human Resource Capabilities, Supply Chain Coordination, and Responsiveness on Supply Chain Resilience

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Abstract: The goal of the study is to see how human resource capabilities, supply chain coordination, and supply chain responsiveness affect supply chain resilience. IT advancement has been studied as a moderating variable. The study collected data from food and beverages firms by conducting a field survey. A questionnaire-based on previous studies was used as a data collection tool. The collected data were analysed using SPSS software Process Macro. Human resource capabilities, supply chain coordination, and supply chain responsiveness all have a substantial impact on supply chain resilience, according to the findings. In the relationship between human resource skills, supply chain coordination, and supply chain resilience, the moderating influence of IT advancement has been verified. However, its impact on the relationship between supply chain responsiveness and supply chain resilience was not proven. These findings will help supply chain managers in developing human resource capabilities, supply chain capabilities, and coordination in the presence of IT advancement to build the resilient supply chain of the firm. In conclusion, the framework used in this study provides a comprehensive way to consider the capabilities factors that can help firms in formulating and aligning various supply chain management resilient strategies.

Keywords: Human Resource Capabilities, Coordination, Responsiveness, Supply Chain Resilience, IT Advancement

1. INTRODUCTION

The recent pandemic of COVID-19 as shown that organisations are now more vulnerable to supply chain disruptions than ever before, therefore, the current complicated economic climate necessitates adaptive and seamless global operations. Supply networks are global, and many of them experience regular disruptions due to their complexity. Because of the fast-paced development, resource scarcity, and the rapid advancement of technology, supply chains are continuing to evolve and alter at a quick pace.

While overseeing global supply chains and collaborating with diverse global partners, businesses are increasingly exposed to the risks of supply chain disruptions caused by unforeseen occurrences such as supplier outages, weather catastrophes, and terrorist acts (Wong et al., 2020). Furthermore, certain disruptions are exacerbated by a company's deliberate use of methods (Benjamin et al., 2015). However, the impacts may alter if those techniques are linked to the firm's human resource and supply chain capabilities. As a result of these incidents, researchers and practitioners are more willing to work together to improve supply chain resilience in order to reduce the likelihood of disruptions having negative consequences.

SCRES (supply chain resilience) refers to a firm's quality to maintain operations in the face of disruptions by laying a sufficient and well-planned foundation (Ponomarov & Holcomb, 2009). In the presence of SCRES, it is expected that businesses would be able to quickly recover from a disruption by either restarting normal business activities or continuing to improve their working performance (Khan & Ullah, 2021; Mandal 2012). Therefore, resilience must be looked into by the organization (Knemeyer et al., 2009).

In previous studies, different capabilities were identified to improve supply chain performance. However, very few studies have analyzed the effect of a combination of supply chain capabilities on supply chain resilience (Gružauskas & Vilkas, 2017). Supply chain coordination and supply chain responsiveness are such capabilities of a supply chain that represent all the vital activities included in the supply chain process. Arshinder et al., (2008 & 2009) have discussed that coordination in the supply chain help in managing interdependencies and diminishing ambiguities, and supply chain coordination depends on the accessibility of quick and correct information that is obvious to all members in supply chain process (as cited in Kumar & Singh, 2017). Supply chain responsiveness is the ability of firms to sense and respond to the market need in time. Both coordination and responsiveness in supply chain processes help to achieve supply chain resilience.

Human-oriented capabilities, like many other supply chain capabilities, are critical for supply chain resilience. Human skills are classified as non-physical strategic resources for businesses that are difficult to replicate by competitors. Human resource capabilities can assist in determining the most appropriate supply chain strategy (Hohenstein et al., 2014). Similarly, information technology adoption is a valuable resource that can assist in overcoming, eliminating, or minimising risks and disruptions encountered during supply chain activities. Supply chain resilience is thought to be achieved by combining capabilities with current information technology development (Gruauskas & Vilkas, 2017).

In previous studies, it has been found that “In contrast to organizational antecedents, little is known about the effects of individual characteristics of supply chain managers and employees on disruption outcomes and recovery processes. In a way, those people who deal with supply chain

disruptions and their consequences in their day-to-day work have been neglected in prior research" (Gehrlein, Bode, & Gerschberger, 2019), "the extensive literature analysis indicated the lack of the understanding of the influence of combined capabilities on supply chain resilience. The influence of supply chain capabilities on resilience lacks theoretical grounding, empirical evidence, and practical implementation possibilities"(Gružauskas & Vilkas, 2017). Moreover, there has been a lack of research on coordination and responsiveness mainly in the context of developing countries (Kumar & Singh, 2017).

To fill the literature gap, two dimensions of supply chain capabilities, i.e., coordination and supply chain responsiveness have been studied. The impact of human resource capabilities on supply chain resilience has also been investigated. Organizations are increasingly relying on information technology to improve the supply chain process (IT). IT advancement for supply chain systems refers to how far a company uses the most advanced technology. IT-enabled supply chain capabilities are unique to each company and difficult to replicate across enterprises (Cavusgil, Kim, Wu &Yeniyurt, 2005). As a result, IT technology has been included in this study as a moderating factor in the association between human resource and supply chain skills and supply chain resilience. been taken into consideration Hence, the threefold purpose of the current research would contribute to existing body of knowledge by providing a greater understanding of how supply chain resilience can be enhanced by having an empirical investigation of the role of supply chain responsiveness, coordination, human resource capabilities, and IT advancement in bringing out supply chain resilience. The study is among the very few where human factor, technology factor, and supply chain capabilities have all been studied together. This would be a major contribution of this study to advance the knowledge of the value of supply chain resilience.

The project aims to look into ways to improve supply chain resilience by making better use of human resources and supply chain skills, as well as improving coordination. This will provide supply chain managers with an understanding of the importance of human resource capabilities, supply chain capabilities, and coordination in the face of technological innovation in order to create a firm's resilient supply chain. Increased knowledge in this area can assist businesses in determining how to establish supply chain resilience plans that take advantage of their existing capabilities.

The remainder of this study includes section two which contains previous literature related to supply chain resilience and capabilities, hypotheses and research model. Next, methodology and data collection procedure were discussed. Section four contains the statistical results conducted to test the hypotheses. Section five contains discussion, limitations, future directions, implications, and conclusion of the study.

2. LITERATURE REVIEW

Theoretical Background

Resource-Based View (RBV) is a theoretical framework that focuses on assembling unusual, valuable, and difficult to duplicate internal resources and competencies that aid firms in gaining a competitive edge (Barney, 1991). Existing literature has highlighted a number of logistics and supply chain-related characteristics that can help a company maintain a competitive advantage and improve its performance. (Mentzer et al., 2008). Dynamic capabilities, particularly in high-velocity marketplaces, are typically difficult to withstand in unpredictable conditions (Eisenhardt & Martin, 2000;Khan & Ullah, 2021). "Dynamic" refers to the ability to renew competencies in order to keep them up to date with the changing environment (Teece et al., 1997). Under such circumstances, resilience principles come into

play, as it maintains the link between ong-term competitive advantage and dynamically integrated capabilities. There is no doubt that no single capability exists, that can create a sustainable competitive advantage. As a result, rather than being stand-alone capabilities, logistical capabilities should be coupled with other appropriate capabilities. Capabilities should be classified and merged in order to have a significant impact on the formation of a robust supply chain and a long-term competitive advantage (Ponomarov & Holcomb, 2009). Based on this hypothesis, this research examines how supply chain capabilities and human resource capabilities interact to affect supply chain resilience.

Taking into consideration the linkage between the effect of resources and capabilities, this study has developed a conceptual model based on resource-based theory (RBV) developed by Grant (1990). The theory emphasizes both tangible and intangible resources that can ultimately provide a competitive advantage to firms. A supply chain is a key process in any organization that acts as a backbone, especially for manufacturing firms. Therefore, factors or capabilities that can help in building supply chain resilience would be important to be investigated. Hence, this study has taken human resources, coordination, and responsiveness with the help of IT advancement as key capabilities that can help resilience capabilities in supply chain research.

Supply Chain Resilience (SCRES)

Supply chain risk management relies heavily on resilience to restore operations and mitigate risk. Supply chain resilience assists in the restoration of a broken or disrupted supply network by rebuilding itself to be stronger than before (Brusset& Teller, 2017). One of the most critical aspects of any organization's supply chain is its ability to withstand disasters, disruptions, and unforeseen events (e.g., Brandon-Jones et al., 2014). A supply chain is said to be resilient when it is able to accomplish its goals of supplying products or services despite these obstacles (Blackhurst et al., 2011; Khan &Ullah, 2021).

Organizations having resilient supply chain must have skills that are not only sufficient to reduce transportation disruptions, but in the case of the next great calamity, limit exposure to a wide range of supply interruptions (Tukamuhabwa, Stevenson, & Busby 2015). Despite the fact that supply chain resilience is a highly in demand attribute for a company, the sources required to attain it have yet to be extensively explored. (Ambulkar et al., 2015). Different qualities have been shown to improve resilience in studies. Natural and man-made disasters have wreaked havoc on today's supply systems (Wagner & Bode, 2008). Several research have looked into the ability to restore the supply chain's working processes to their former state following a disturbance (Pettit et al., 2010). Despite the fact that many studies have been conducted on the influence of capabilities on resilience, the company's role of identifying and utilizing these skills remains critical.

Human Resource Capabilities (HRC)

Human resource (HR) capability is defined as employee behaviour based on shared knowledge (unique) that develops through time (Huselid, 1995). Controlling HR policies and procedures allows a company to gain, nurture, and maintain the capacity to organise human resources, which is the foundation of HR ability (Chuang et al., 2015).

Human resource capabilities are becoming increasingly important in formulating company strategies and their impact on firm success. Knowledge, skills, experience, and the degree of dedication committed to the organisation have all been listed in the literature as essential parts of human resource capabilities (Khan & Ullah, 2021; Wiklund & Shepherd, 2003). In their study, Khan et al. (2013) discovered that firms can improve their supply chain performance by adopting and combining human

resource management (HRM) principles with supply chain management (SCM). Organizational resilience can be established by a company by developing capacities among core personnel at the individual level, which helps firms cope with uncertainty and respond effectively to situation-specific risks when aggregated at the organisational level. Finally, by engaging in transformative activities and managing human resources tactically, firms can take advantage of disruptive surprises that threaten their survival (Lengnick-Hall et al., 2011). With the importance of supply chain resilience in mind, the following hypothesis was developed:

H_1: *HRC have a positive effect on the SCRES.*

Supply Chain Coordination (SCC)

The ability of a company to harmonise operation-related activities with its supply chain partners is referred to as firm coordination (Clemons & Row, 1993; Shin, 1999). "As global supply chains compete with one another, achieving responsiveness in meeting consumers' expectations is becoming increasingly vital for firms to stay competitive in today's internet-powered and competitive business world," Thatte and Agrawal (2017) wrote. When supply and demand are matched in a supply chain network, information exchange can aid in the reduction of demand ambiguity and the expense of stocks in the supply chain (Frohlich, 2002). When supply chain partners' coordination improves, it aids in the manufacturing and delivery of a firm's product or service to clients at a faster and lower cost (Lin, Huang, & Lin, 2002). Furthermore, the entire supply chain structure simplifies the organisational process, and suppliers cut lead times (Christopher &Ryals, 1999; Ullah, 2020).

A company's ability to alter and implement its strategy ahead of competitors throughout the supply chain is improved as opportunities occur. Information sharing and collaborative communication are critical for supply chain resilience because they provide visibility, flexibility, and velocity, all of which lead to supply chain resilience. Organizations must examine the type of information provided (which includes shipment information, interruption forecasts, and maintenance schedules), as well as the rate, medium, and direction of information sharing (Scholten&Schilder, 2015; Ullah, 2020). As a result, it is possible to speculate that

H_2: *SCC has a positive effect on SCRES*

Supply Chain Responsiveness (SCR)

The degree to which the supply chain network's affiliates collaborate in a changing environment is known as supply chain responsiveness. It aids a company in the development and renewal of certain competencies in order to better respond to environmental developments (Teece et al., 1997). When a risk event occurs, responsiveness ensures a proper response and adaptation to disruptions so that recovery can begin as soon as possible. The faster a company responds to disruptions, the faster it recovers, which lessens the disruption's total impact (Manuj&Mentzer, 2008). Strong support of "operations systems responsiveness and supplier network responsiveness" improved enterprises' "logistics systems responsiveness," according to Asamoah, Nuertey, Agyei-Owusu, and Akyeh (2021). It has been hypothesised that responsiveness enhances resilience.

H_3: *SCR has a positive effect on SCRES*

IT-Advancement

The use of information technology (IT) has increased the focus of global company on supply chain process management (Wu et al., 2006). Konˇcar et al., (2020) argued that "Digitalization is a trend that is imposed in modern conditions in all spheres of human activity. The COVID-19 pandemic is just the catalyst that hastened this trend and pointed to the need for digitalization. Research has shown that the implementation of digital strategies based on the IoT platform in supply chains gives concrete results".

IT advancements enable organizations to have an efficient information flow about supply chain orders, inventory as well as products (Zhu et al., 2006). Mikalefand Pateli (2017) further added to this "An IT-enabled sensing capability can help ensure that competitor moves are closely monitored and that sufficient feedback by customers is received and analyzed to inform management decisions. Firms with a strong IT-enabled sensing capability would have a head start in adjusting internal operations to respond to possible shifts in the business environment and would have an advantage in capitalizing on the market by new or improved value propositions as a result of focused deployments. However, responsiveness to change can often mean having to coordinate activities across different units or functions. This ability would also require that an effective IT-enabled coordination capability is established".

Ivanov, Dolgui, and Sokolov (2018) in their study explored that how digital technologies including industry 4.0 affect supply chain performance. They further highlighted the need to study the effects of new and emerging technologies on different areas of the supply chain. The effect of different technologies on supply chain working and performance has been studied in different research e.g (Ben-Daya, Hassini, &Bahroun, (2018); Choi, Wallace, and Wang (2018), Liao et al., (2017); Strozzi et al., (2017), etc. The majority of these studies are qualitative in nature based on a literature review. This research has taken IT advancement in general as a variable that could strengthen the relationship between capabilities and supply chain resilience. Thus, the following hypotheses have been formulated:

$H_{1(a)}$: *IT advancement moderates the relationship between HRC and SCRES*

$H_{2(a)}$: *IT advancement moderates the relationship between SCC and SCRES*

H3(a): *IT advancement moderates the relationship between SCR and SCRES*

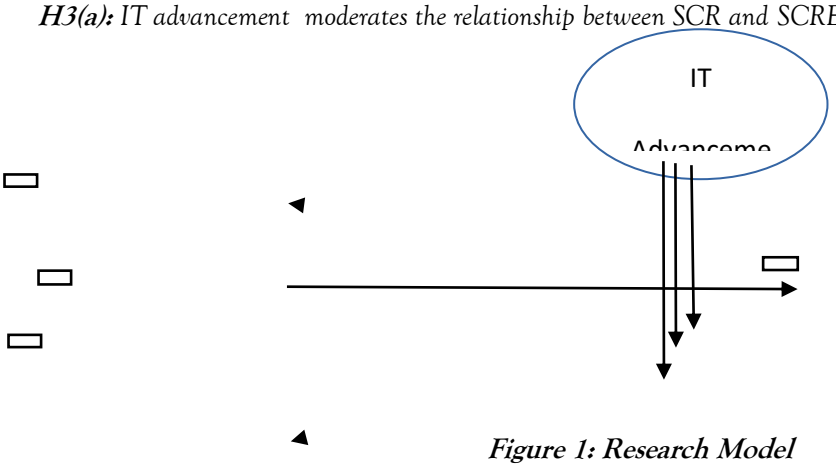

Figure 1: Research Model

3. Methodology

The study is cross-sectional in nature. The design for this research involves a survey method. The population of the study was the food and beverages industry in Pakistan. The key informants were employees of these private food and beverages organizations. The respondents were at the managerial level as they have more information regarding operations and the company's capabilities.Hence,

individual managerial level employees were the unit of analysis for this study. A convenient sampling technique was used for the sample selection.

Data Collection

The study used questionnaire as an instrument of data collection to investigate the variables. The questionnaire included questions related to the background information of respondents and also included scale items of the variables. Employees of various private food and beverage enterprises in the selected cities were given the surveys. They were accessed during office hours to provide their responses. The distribution of questionnaires was also done through emails. In total, 250 questionnaires were distributed, out of which only 201 useful responses were received, reflecting an 80 percent response rate. After distributing the questionnaires, researchers did a follow-up visit to collect the filled questionnaires. Follow-up emails were also sent to the respondents.

Sources of Instrument Scale Items

Supply chain resiliencewas measured using 6- items adopted from the study of Gölgeci and Ponomarov (2015). The items were measured using a five-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5). The example questions included in the scale are "Our firm's supply chain can move to a new desirable state after being disrupted", and "our firm's supply chain can quickly return to its original state after being disrupted". Human resource capabilities variable was measured using 4 items scale used in the study of Lin (2017). The scale was based on 5 points Likert scale and included the items like "In your firm, employees have a deep understanding of the business priorities and goals". Supply chain coordination was assessed using 5- items scale adopted from the study of Wu et al., (2006). The items were measured using 5 points Likert scale. The example of items included "My company spends less time coordinating transactions with our partner than our competitors with theirs".

For measuring supply chain responsiveness, the 5-items scale was adapted from the study of Wu et al., 2006; Ullah, 2020). The example of items included "compared to our competitors, our supply chain responds more quickly and effectively to changing customer and supplier needs". The 5 items scale for IT advancement was adapted from the study of Wu et al., (2006). It was assessed through a 5-points Likert scale. The example of items included in this construct was "Our IT for Supply Chain Communication System is always state-of-art technology".

4. Results

The data was analyzed using SPSS software version 20. In the first step, descriptive analysis was conducted using measures of means, correlation, standard deviation and skewness. Next, regression analysis was conducted to test the hypothesized relationships between the variables.

Demographic Analysis of the Data

According to the data in table 1, the study's respondents were 81.1 percent males and 18.9 percent female employees. The bulk of those who responded were between the ages of 20 and 30. (43.8 percent). Only 37.8% were between the ages of 31 and 40, while 18.4% were between the ages of 41 and 50. In terms of education, the majority of respondents had a bachelor's degree (49.8%), 44.3 percent had a master's degree, and 6.0 percent had no education. In terms of experience, 43.3 percent

of respondents had less than five years of experience, 19.4 percent had five to ten years of experience, and 37.3 percent had more than ten years of experience.

Table 1

Demographic Variables

		Category	Frequency	Percentage
1	*Gender*	Male	163	81.1
		Female	38	18.9
2	*Age*	20-30	88	43.8
		31-40	76	37.8
		41-50	37	18.4
3	*Education*	Bachelors	100	49.8
		Masters	89	44.3
		Others	12	6.0
4	*Experience*	Less than 5 years	87	43.3
		5-10 years	39	19.4
		Above 10 years	75	37.3
		Total	201	100

Means, S.D, Correlation and Cronbach's Alpha

The mean, standard deviation, Cronbach's alpha, and Pearson correlation values are shown in table 2. The table 2 shows that mean and standard deviation values for human resource capabilities was (M=3.40, *S. D*=0.68), for supply chain coordination (M=3.56, *S.D* .611); for supply chain responsiveness (M=3.56, S. *D*= 0.58); for IT advancement (M=2.97, *S.D* =0.80) and for supply chain resilience were (M=3.63, *S. D*= 0.700). To confirm the internal consistency of the items, the reliability test was conducted. Table 2 demonstrates that Cronbach's alpha values for all five variables are more than 0.6, indicating that all of the questionnaire's items are reliable.

Table 2

	Variables	*1*	*2*	*3*	*4*	*5*	*α*	*M*	*S. D*
1	HR Capabilities	1					.872	3.40	.68
2	Coordination	.513**	1				.793	3.56	.61
3	SC Responsiveness	.597**	.687**	1			.782	3.56	.58
4	IT Advancement	.524**	.511*	.628**	1		.935	2.97	.80
5	SC Resilience	.677**	.604**	.586**	.708**	1	.873	3.63	.70

** Values significant at two confidence intervals < 0.05. 0.10

* Values significant at one confidence interval < 0.10

Means, S.D, Correlation and Cronbach's Alpha

The Pearson correlation values show that all variables were positively correlated with each other. The highest correlation was found between supply chain resilience and IT advancement (p=.708), while the lowest correlation was observed between IT advancement and coordination (p=.511). Factor analysis was also conducted to ensure the validity of the selected construct.

Hypotheses Testing

The goal of regression analysis was to predict dependent variables based on a set of independent variables. The impact of HRC (human resource capabilities), SCC (Supply chain coordination), and SCR (supply chain responsiveness) on SCER (supply chain resilience) was investigated in this study, with the function of IT advancement as a moderating factor. The PROCESS macro in SPSS programme was used to conduct the analysis. Model 1 of the PROCESS macro was chosen since the model includes a moderator.

Table 3

HRC, IT Advancement & SCRES

	R	***R^2***	***F***	***df1***	***df2***	***P***
	.603	.483	65.167	3.000	141.000	.000
	β	***Se***	***t***	***p***		
IT	.254	.046	3.325	.001		
HRC	.318	0819	2.541	.012		
IT*HRC	.214	.0508	10.938	.012		

SCRES= Supply Chain Resilience, HRC= Human Resource Capabilities ,R^2 Change = 12.01%

The regression analysis findings for hypotheses H1 and H1(a) are shown in Table 3. (a). Human resource capabilities have a favourable impact on supply chain resilience (β= 0.318, p=0.01), according to the statistical findings in table 3. As a result, H1 was backed up. Therefore, it can be established that focusing and working on human resource capabilities in an organisation can have a favourable impact on the firm's supply chain resilience.

The table also shows the positive impact of IT Advancement (β = 0.254, p = 0.001) on supply chain resilience. To check the moderation effect, the interaction term of human resource capabilities and IT advancement was regressed which shows the positive result (β = 0.214, p = 0.00). The positive beta value for the interaction term suggests that as technology advances, the relationship between human resource capabilities and supply chain resilience becomes stronger. The increase in R^2 due to interaction was 12.01%. As a result, IT Advancement played a key role in human resource capacities and supply chain resilience. Hence, hypotheses 1(a) and 1(b) were accepted. The level of this moderating effect is depicted graphically in figure 2.

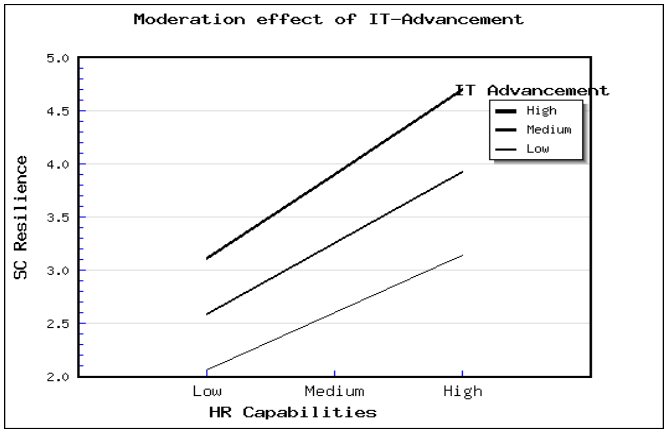

Figure 2: Moderation effect ofHRC, IT Advancement & SCRES

Table 4

SCC, IT Advancement & SCRES

	R	***R²***	***F***	***df1***	***df2***	***P***
	.57	.35	59.17	3.00	141.00	.000
	β	***Se***	***t***	***p***		
IT	.254	.046	3.325	.001		
SC Coordination	.504	.085	2.42	.002		
IT*Coordination	.127	.063	1.64	.003		

SCC=Supply chain coordination,R^2 Change = 22%

The statistical values shown in table 4 indicate that supply chain coordination has a significant impact on supply chain resilience (β=0.504, p=.002), hence, H2 was accepted that there is a positive impact of supply chain coordination on supply chain resilience. Table 4 also shows that the impact of IT Advancement (β = 0.254, p = 0.001) on supply chain resilience was significant. To check the moderation effect, an interaction term between supply chain coordination and IT Advancement was regressed. The statistical results confirmed the significant effect (β = 0.127, p = 0.003). Hence, hypothesis 2(a) was also accepted. The model fit values in table 4 indicate that the overall model was significant (F=59.17, p= 0.00).

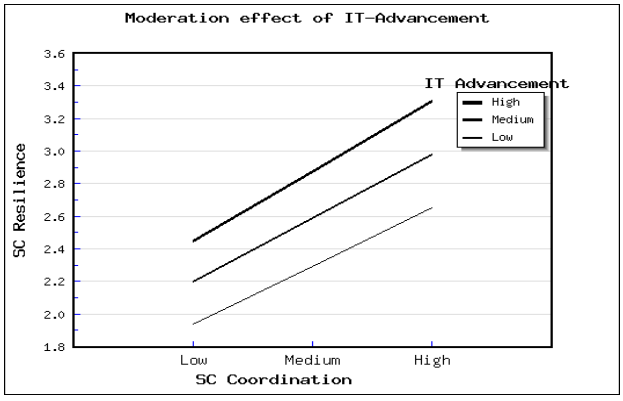

Figure 3: Moderation effect of SCC, IT Advancement & SCRES

Table 5

SCR, IT Advancement & SCRES

		R	R^2	*F*	*df1*	*df2*	*P*
		.60	.45	152.15	3.00	141.00	.000
		β	*Se*	*t*	*p*		
1	IT	.254	.046	3.32	.001		
2	SC Responsiveness	.621	.074	6.54	.002		
3	IT* Responsiveness	-.112	.069	1.64	.358		
	R^2 Change due to Interaction Term = 1.15%						

Supply chain responsiveness has a favourable impact (β= 0.621, p=.002) on supply chain resilience, according to the statistical values in table 5, providing a support to H3. As a result, it can be deduced that an organization's responsive supply chain plays a significant role in ensuring supply chain resilience. The moderation effect of IT advancement between supply chain responsiveness and supply chain resilience was not established, contrary to expectations (β = -.112, .358). Hence, H3(a) was rejected.

5. Discussion

The study's main goal was to determine the effect of human resource and supply chain capabilities on supply chain resilience, with IT advancement serving as a moderating factor. The outcomes of this study helped to answer the research issue of whether or not firms can establish a resilient supply chain by successfully recognising and leveraging their human resource, supply chain coordination, and supply chain capabilities.

The findings suggest that food and beverage companies' human resource capabilities have a considerable positive impact on supply chain resilience. According to RBV theory, combining rare, distinctive qualities and resources can help a company acquire a competitive edge. Human resource capabilities are also one-of-a-kind assets that may help companies develop a more robust supply chain. Companies can use their employees' knowledge, productivity, and commitment to better handle organisational disturbances and re-establish the organization's original flow of work activities after disruptions. Furthermore, the data support the idea that IT Advancement plays a moderating function in the relationship between human resource capabilities and supply chain resilience. In the light of industrial 4.0 technologies, Dary, Nurhaeni& Suharto (2019) stated that "In addition to improving the quality of technology to improve Supply Chain Management (SCM), it is necessary to do strategic planning of human resources to bridge suppliers with international capacity in using technology that has been provided by the government to innovate or cooperate with other countries".Srinivasan, Hamdani, and Ma (2021) also emphasized the benefits of leadership styles for an integrated supply chain by mentioning the role of leadership philosophy, organizational culture, and compatible supply chain relationships. The findings are a useful addition to the human resource management literature as well, as they can train and develop the firm's human resources from a supply chain resilience perspective. The Covid-19 has already posited a need to restructure the way of working and doing business.

The findings for one of the supply chain skills, namely, coordination across supply chain partners, revealed that there is a significant association between supply chain coordination and supply chain resilience. The better coordination mechanisms in the supply chain network help to remove complexities. Information technologies play an important role in this matter, as IT systems facilitate the coordination mechanisms. This is particularly important because recent years have witnessed that supply chains have encountered different events that have imperiled the operational execution and excellence of supply chain systems. For example, the COVID-19 pandemic has affected both local and global supply chain networks. This has greatly posed a need for companies to invest in supply chain resilience by focusing on expanding supply chain flexibility and by creating capacities like repetition, multi-sourcing, coordinated effort, and inventory adaptability, which guarantee to more readily secure supply chain against unanticipated disturbances (Ivanov, 2020, 2018).

The study findings have proved the positive moderating effect of IT advancements in enhancing supply chain coordination and supply chain resilience. This can pose that IT systems enable the supply chain systems to have an effective information flow by having low cost. Recent studies have also highlighted the importance and potentials of information technologies to manage disruptions (Ivanov&Dolgui, 2020b) and have supply chain resilience. The role of IT in the supply chain was also supported in the study conducted by (Yao & Zhu, 2012), who highlighted the level of IT intensity for optimum level of inventories and demand in the supply chain process.

The study's empirical findings also showed that supply chain responsiveness has a favourable impact on supply chain resilience. These findings are consistent with the study of Carvalho, Azevedo, and Cruz-Machado (2014) who argued that "the degree of flexibility, velocity, responsiveness, competence, visibility, and collaboration will influence the supply chain behaviour supporting the quick response changes in demand in terms of volume and variety (agility)and the recovery after a disturbance occurrence (resilience)". On contrary to expectations, the moderating role of IT advancement between supply chain responsiveness and resilience was not proven in this study.

Limitations of the study & Future Research Directions

There were certain limitations in this study that may have limited the generalizability of the findings. First, time was a major restriction throughout the study's execution; some participants were unable to react in a timely manner, and their responses were therefore excluded from the study. Second, respondents differed in terms of age, gender, job type, education level, and other factors that may have influenced their responses. Third, due to biases in self-reported data, employees' responses may not be accurate.

Future research could look into a wide range of supply chain capabilities across various geographical regions or industries. Future research may be longitudinal, and the sample size may be increased to produce more accurate and generalised results. Researchers can apply these findings in future research because there are few studies on human resource and supply chain abilities mixed with supply chain resilience. They can apply this principle to industries other than food and beverage.

Implications for Managers

The first management implication of this research is that food and beverage companies must create various supply chain resilience measures. To strengthen the supply chain's resilience, companies should concentrate on their human resource capabilities. Companies must also work to improve the coordination and responsiveness of their supply chains. This study found that being quick and effective in responding to external or internal changes can help firms recover more quickly from supply chain

interruptions. Managers must be concerned about the role of IT advancement in improving these relationships.

Resources invested in IT advancements can bring several advantages e.g., it can enable their human resource to be able to respond to any disruptions and building their supply chain resilience capabilities. Firms should build their IT advancement to get the benefits of shared information which can strengthen their coordination in the supply chain network. These practical implications are particularly important for companies as the world has seen major disruptions of COVID-19. In this time, firms having strong IT support were better able to cope with the disruptions. The current study strongly emphasized building human resources capabilities, coordination as well as responsiveness with a robust IT infrastructure to shape their supply chain resilient. The human resource managers need to change or mould their training programs to drilling employees in such a way that they can contribute to making supply chain resilience in their best possible way.

Theoretical Implications

There are many theoretical implications of the study. The study has added to the resource-based view theory to confirm the human resource, IT resource, and intangible capabilities of coordination and responsiveness for better supply chain resilience. Alongside, the study has enriched the literature of supply chain resilience with a particular focus on human resources and IT advancement. Although many previous studies investigated the role of individual technologies in supply chain performance, this study has explored IT advancement as a moderator between capabilities and resilience. This is an important contribution to the literature as it confirms that IT is such a resource that not only enhances supply chain performance but it also strengthens the linkage of other capabilities and resilience.

6. CONCLUSION

In the present time of uncertainty and turbulence, almost every firm is now exposed to the risk of supply chain disruptions. Among other firms, food and beverages firm are those, that may unexpectedly confront unsure work and operations requirements - for instance, those brought about by uncommon occasions like the COVID-19 pandemic. Therefore, firms can confront abrupt or serious interruptions in the inventory network. In such circumstances, supply chain managers need to recognize and find the best way to build their supply chain resilience. Because today's worldwide and sophisticated supply chain system is more susceptible to interruptions than ever before. Managers are constantly seeking for methods to make their supply chain stronger than ever before in order to deal with such disruptions. Accordingly, a comprehension of how firms can oversee supply chain disturbances has gotten a significant subject from both research and practice perspectives. In conclusion, the framework used in this study provides a comprehensive way to consider the capabilities factors that can help firms in formulating and aligning various supply chain management resilient strategies.

REFERENCES

Arshinder, K.A., &Deshmukh, S.G. (2008). Supply chain coordination: perspectives, empirical studies, and research directions, *International Journal of Production Economics*, 115, 316-35.

Arshinder, K.A., &Deshmukh, S.G. (2009). A framework for evaluation of coordination by contracts: a case of two-level supply chains, *Computers & Industrial Engineering*, 56, 1177-91.

Ambulkar, S., Blackhurst, J., &Grawe, S. (2015). Firm's resilience to supply chain disruptions: Scale development and empirical examination. *Journal of operations management*, *33*, 111-122.

Asamoah, D., Nuertey, D., Agyei-Owusu, B. &Akyeh, J. (2021). The effect of supply chain responsiveness on customer development, *The International Journal of Logistics Management,* Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/IJLM-03-2020-

Agarwal, A., Shankar, R., &Tiwari, M.K., (2006). Modeling the metrics of lean, agile and leagile supply chain: an ANP-based approach. *Eur. J. Oper. Res.* 173, 211–225.

Barney, J. (1991). Firm resources and sustained competitive advantage, *Journal of Management*, *17*(1), 99-120.

Ben-Daya, M., Hassini, E., &Bahroun, Z. (2019). Internet of things and supply chain management: a literature review. *International Journal of Production Research*, *57*(15-16), 4719-4742.

Bhamra, R., Dani, S., &Burnard, K. (2011). Resilience: the concept, a literature review and future directions. *International journal of production research*, *49*(18), 5375-5393.

Tukamuhabwa, B. R., Stevenson, M., Busby, J., &Zorzini, M. (2015). Supply chain resilience: definition, review and theoretical foundations for further study. *International Journal of Production Research*, *53*(18), 5592-5623.

Blackhurst, J., Dunn, K. S., &Craighead, C. W. (2011). An empirically derived framework of global supply resiliency. *Journal of business logistics*, *32*(4), 374-391.

Brusset, X., & Teller, C. (2017). Supply chain capabilities, risks, and resilience. *International Journal of Production Economics*, *184*, 59-68.

Brandon-Jones, E., Squire, B., Autry, C. W., & Petersen, K. J. (2014). A contingent resource-based perspective of supply chain resilience and robustness. *Journal of Supply Chain Management*, *50*(3), 55-73.

Carvalho, H., Azevedo, S. G., & Cruz-Machado, V. (2014). Supply chain management resilience: a theory building approach. *International Journal of Supply Chain and Operations Resilience*, *1*(1), 3-27.

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

Christopher, M., &Ryals, L. (1999). Supply chain strategy: Its impact on shareholder value. *International Journal of Logistics Management, 10*(1), 1 – 10.

Clemons, E. K., & Row, M. C. (1993). Limits to interfirm coordination through information technology: Results of a field study in consumer-packaged goods distribution. *Journal of Management Information Systems, 10*(1), 73– 95. .

Dary, N. H., Nurhaeni, I. D. A., & Suharto, D. G. (2019, November). Public-Private PartnershipIn Indonesian Urban Water Sanitation And Hygiene Program: Human Resource Capacity's Innovation. In *Iapa Proceedings Conference* (pp. 448-471).

Eisenhardt, K.M. & Martin, J.A. (2000). Dynamic capabilities: what are they?,*Strategic Management Journal*, *21* (10/11), 1105-21.

Esper, T., Fugate, B. & Davis, B. (2007). Logistics learning capability: sustaining the competitive advantage gained through logistics leverage, *Journal of Business Logistics*, *28* (2), 57-82.

Fiksel, J. (2006). Sustainability and resilience: toward a systems approach. *Sustainability: Science, Practice and Policy*, *2*(2), 14-21.

Frohlich, M. T. (2002). E-integration in the supply chain: Barriers and performance. *Decision Sciences, 33*(4), 537– 556..

Gosain, S., Malhotra, A., & El Sawy, O.A., (2005). Coordinating for flexibility in e-business supply chains. *J. Manag. Inf. Syst. 21*, 7–45.

Grant, R. M. (1996). Toward a knowledge-based theory of the firm.*Strategic Management Journal, 17*, 109–122.

Gehrlein, S., Bode, C., &Gerschberger, M. (2019, July). The Effect of Experience on Supply Chain Disruptions and Recovery Time.In *Academy of Management Proceedings* (Vol. 2019, No. 1, p. 17911). Briarcliff Manor, NY 10510: Academy of Management.

Gružauskas, V., &Vilkas, M., (2017). Managing capabilities for supply chain resilience through it integration. *Economics and Business*, *31*(1), 30-43.

Gowen, C.R. &Tallon, W.J., (2003). Enhancing supply chain practices through human resource management, *Journal of Management Development*, 22(1), 32 44. https://doi.org/10.1108/02621710310454842

Hohenstein, N.-O., Feisel, E. & Hartmann, E., (2014). Human resource management issues in supply chain management research: A systematic literature review from 1998 to 2014, *International Journal of Physical Distribution & Logistics Management*, 44 (6), pp. 434 463. https://doi.org/10.1108/IJPDLM-06-2013-0175

Chuang, H. M., Liu, M. J., & Chen, Y. S. (2015). The effects of human resource capability and internal customer satisfaction on organizational effectiveness. *International Journal of Distributed Sensor Networks*, *11*(7), 835194.

Huselid, M.A. (1995). The impact of human resource management practices on turnover, productivity, and corporate financial performance. *Academy of Management Journal*, *38* (3), 604-623

Ivanov, D., Sethi, S., Dolgui, A., &Sokolov, B. (2018). A survey on control theory applications to operational systems, supply chain management, and Industry 4.0. *Annual Reviews in Control*, *46*, 134-147.

Jüttner, U. and Maklan, S. (2011). Supply chain resilience in the global financial crisis: an empirical study, *Supply Chain Management*, 16(4), 246-259

Knemeyer, A. M., Zinn, W., &Eroglu, C. (2009). Proactive planning for catastrophic events in supply chains. *Journal of operations management*, *27*(2), 141-153.

Khan, N. R., Taha, S. M., Ghouri, A. M., Khan, M., & Ken, Y. (2013). The impact of HRM practices on supply chain management success in SME. *LogForum*, *9*(3), 177-189.

Khan, K. M., Ullah M. (2021).Mediating Role of Ethical Leadership Between Employees Empowerment and Competitive Edge: A Case of Commercial Banks in Pakistan. *Humanities & Social Sciences Reviews*, *9*(2), 219-231.

Kumar, R. & Kumar Singh, R., (2017).Coordination and responsiveness issues in SME supply chains: a review", *Benchmarking: An International Journal*, 24(3), 635 650. https://doi.org/10.1108/BIJ-03-2016-0041

Končar, J., Grubor, A., Marić, R., Vučenović, S., &Vukmirović, G. (2020). Setbacks to IoT implementation in the function of FMCG supply chain sustainability during COVID-19 pandemic. *Sustainability*, *12*(18), 7391.

Lengnick-Hall, M. L., Lengnick-Hall, C. A., &Rigsbee, C. M. (2013). Strategic human Resource management and supply chain orientation. *Human Resource Management Review*, *23*(4), 366-377.

Hsiu-Fen Lin, (2017). Antecedents and consequences of electronic supply chain management diffusion: The moderating effect of knowledge sharing, *The International Journal of Logistics Management*, 28 (2),699-718, https://doi.org/10.1108/IJLM-01-2016-0023

Lin, F. R., Huang, S. H., & Lin, S. C. (2002). Effects of information sharing on supply chain performance in electronic commerce. *IEEE Transactions on engineering management*, *49*(3), 258-268.

Liao, Y., Y. Deschamps, E. de Freitas, R. Loures, & L. F. P. Ramos. (2017). Past, Present and Future of Industry 4.0 – a Systematic Literature Review and Research Agenda Proposal.*International Journal of Production Research* ,55 (12),3609–3629

Mandal, S. (2012).An Empirical Investigation into Supply Chain Resilience. *IUP Journal of supply chain management*, *9*(4).

Mikalef, P., &Pateli, A. (2017). Information technology-enabled dynamic capabilities and their indirect effect on competitive performance: Findings from PLS-SEM and fsQCA. *Journal of Business Research*, *70*, 1-16.

Manuj, I., &Mentzer, J. T. (2008).Global supply chain risk management. *Journal of business logistics*, *29*(1), 133-155.

Morash, E.A., Droge, C.L.M. & Vickery, S.K. (1996). Strategic logistics capabilities for competitive advantage and firm success. *Journal of Business Logistics*, *17* (1), 1-22.

Mentzer, J. T., Stank, T. P., &Esper, T. L. (2008). Supply chain management and its relationship to logistics, marketing, production, and operations management. *Journal of business logistics*, *29*(1), 31-46.

Murino, T., Romano, E., &Santillo, L. C. (2011, December). Supply chain performance sustainability through resilience function. In *Proceedings of the 2011 Winter Simulation Conference (WSC)* (pp. 1600-1611).IEEE.

Park, K. (2011). *Flexible and Redundant Supply Chain Practices to Build Strategic Supply Chain Resilience: Contingent and Resource-based Perspectives*. PhD dissertation., The University of Toledo.

Pettit, T., Fiksel, J., &Croxton, K., (2010). Ensuring supply chain resilience: development of a conceptual framework. *J. Bus. Logist. 31*(1), 1–21.

Ponomarov, S. Y., & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. *The international journal of logistics management*. 20 (1), 124-143

Powell, T. C., & Dent-Micallef, A. (1997). Information technology as competitive advantage: The role of human business, and technology resources.*Strategic Management Journal, 18*(5), 375– 405.

Ralston, P., &Blackhurst, J. (2020). Industry 4.0 and resilience in the supply chain: a driver ofcapability enhancement or capability loss?. *International Journal of Production Research*, *58*(16), 5006-5019.

Rogers, D. S., Daugherty, P. J., & Stank, T. P. (1993). Enhancing service responsiveness: The strategic potential of EDI. *Logistics Information*Sinkula *Management, 6*(3), 27– 32.

Sahin, F., & Robinson, E. P. (2002). Flow coordination and information sharing in supply chains: Review, implications, and directions for future research. *Decision Sciences, 33*(4), 505– 536.

Scholten, K. and Schilder, S. (2015). The role of collaboration in supply chain resilience, *Supply Chain Management*, 20 (4), 471-484. https://doi.org/10.1108/SCM-11-2014-0386

Shin, N. (1999). Does information technology improve coordination? An empirical analysis. *Logistics Information Management, 12*(1/2), 138– 144.

Shuai, Y., Wang, X., & Zhao, L. (2011, December). Research on measuring method of supply chain resilience based on biological cell elasticity theory. In *2011 IEEE International Conference on Industrial Engineering and Engineering Management* (pp. 264-268).IEEE.

Sinkula, J. M., Baker, W. E., &Noordewier, T. (1997). A framework for market-based organizational learning: Linking values, knowledge, and behavior. *Journal of Academy of Marketing Science, 25*(4), 305– 318.

Spiegler, V. L. M., M. M. Naim, & J. Wikner. (2012). A Control Engineering Approach to the Assessment of Supply Chain Resilience. *International Journal of Production Research 50*(21): 6162–6187.

Srinivasan, M., Hamdani, M., & Ma, S. (2021). Four supply chain management systems: From supply chain strategies to human resource management. *Business Horizons*. 64(2),249-260

Strozzi, F., C. Colicchia, A. Creazza, & C. Noè., (2017).Literature Review on the 'Smart Factory' Concept Using Bibliometric Tools.*International Journal of Production Research* 55 (22): 6572–6591

Sundram, V. P. K., Rajagopal, P., NurAtiqah, Z. A., Atikah, S. B., Appasamy, G., &Zarina, A. M. (2018). Supply chain responsiveness in an Asian global electronic manufacturing firm: ABX energy (M). *International Journal of Supply chain management*, *7*(2), 23-31.

Teece, D. J., Pisano, G., &Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509–533.

Thatte, A., &Agrawal, V. (2017). Exploring supply chain responsiveness effects on competitive advantage of a firm. *Quarterly Review of Business Disciplines*, *4*(3), 211-228.

Tippins, M. J., &Sohi, R. S. (2003). IT competency and firm performance: Is organizational learning a missing link? *Strategic Management Journal, 24*(8), 745– 761.

Tukamuhabwa, B. R., M. Stevenson, & J. Busby., (2015). Supply Chain Resilience: Definition, Review and Theoretical Foundations for Further Study.*International Journal of Production Research 53*(18): 5592–5623.

Ullah, M. (2020). Women Empowerment and Social Development in Afghanistan through Micro Finance. International Journal of Academic Research in business and Social Sciences, 10(12), 377-389

Wagner, S. M., & Bode, C. (2008). An empirical examination of supply chain performance along several dimensions of risk. *Journal of business logistics*, *29*(1), 307-325.

Wong, C. W., Lirn, T. C., Yang, C. C., & Shang, K. C. (2020). Supply chain and external conditions under which supply chain resilience pays: An organizational information processing theorization. *International Journal of Production Economics*, *226*, 107610.

World Economic Forum (2013). Building resilience in supply chains: an initiative of the risk response network in collaboration with accenture, *Industrial Agenda,* Accenture, January, pp. 1-44.

Wiklund, J. & Shepherd, D. (2003). Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium sized businesses, *Strategic Management Journal,24* (13), pp. 1307-1314.

Wu, F., Yeniyurt, S., Kim, D., &Cavusgil, S. T. (2006). The impact of information technology on supply chain capabilities and firm performance: A resource-based view. *Industrial Marketing Management*, *35*(4), 493-504.

Yao, Y., & Zhu, K. X. (2012). Research note—Do electronic linkages reduce the bullwhip effect? An empirical analysis of the US manufacturing supply chains. *Information Systems Research*, *23*(3-part-2), 1042-1055.