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Effect of Technological Innovations on Logistics and Supply Chain Management (LSCM) in the context of Belt and Roads Initiative (BRI): A moderating effect of Adoption and Diffusion

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Purpose/Aim: The primary aim of this study was to determine how technology innovation can support logistics and supply chain management in the context of Belt and Road Initiatives (BRI). **Method:** In this study, the researcher has the following primary data collection methods and quantitative research design. The data has been gathered through a survey questionnaire, whereas the sample size of the study was 430. Data analysis has been conducted through Structural equation modelling (SEM), in which the researcher has conducted different tests, including confirmatory factor analysis, discriminant validity, model assessment, and path assessment. **Findings:** The findings of this study confirm the significant impact of all the independent variables on logistics and supply chain management (LSCM) in BRI. The independent variables of this study include artificial intelligence, big data, enterprise resource planning, social media, and blockchain. Apart from that, this study's results also reveal the significant moderating effect of adoption and diffusion (AD) on the association between technology innovation and LSCM in BRI. **Limitations:** The absence of qualitative data and the narrow scope of the study have been some of the significant limitations of this study. In the future, it is suggested that a mixed research design will be used to make a valuable contribution to the existing literature.

Key words: *Logistics and Supply chain management **(LSCM)**; Belt and Road Initiatives **(BRI)**; Artificial Intelligence **(AI)**; Enterprise Resource Planning **(ERP)**; Big Data **(BD)**; Social Media **(SM)**; Blockchain **(BKC)**; Adoption and Diffusion **(AD)**.*

1. Introduction

The transactional belt and road initiative (BRI) was initiated by China in 2013, which helped connect the supply chains, business operations, and people (Rabena, 2018; Liu et al., 2018; Ram and Zhang, 2020). On the other hand, the economic infrastructure has shaped the strategic management of the various businesses pertaining to the path line of this belt and road initiative (Yu, 2017; Li, Liu and Qian, 2019; Thürer et al., 2020). In this manner, the opportunities are provided by the six economic corridors including China-Indochina Peninsula Corridor, China-Mongolia-Russia Corridor, Bangladesh-China- Myanmar Corridor, China-Pakistan Corridor, China-Central Asia-West Asia Corridor, and New Eurasian Land Bridge, which make up the fundamental BRI while attracting huge investments of an expected $1 trillion above the lifecycle of BRI. In contrast to these investments, it has also posed new challenges for most of the businesses which are operating through these corridors (Hahm and Raihan, 2018). Particularly, establishing the belt and road initiative for the supply chain management of the companies which will involve trade with over 70 countries. These are operationally sustainable, secure, and value-driven remain precedence for the businesses that are inclined towards the benefits of development and connectivity along the economic corridors of BRI (Thürer et al., 2020).

The compound nature of the BRI aggravates the situation making the supply chain of BRI more prone to the risks while involving security threats, operational and financial risks along with the other risks (Wang, 2018; Gholizadeh et al., 2020). In this manner, the concerns related to the sustainability of the supply chain of BRI are raised by debt-financed projects of this initiative (Wijeratne et al., 2018). On the other hand, there is a considerable role of technological innovation in the enhancement of LSCM. It is because the advancement of technology has integrated the entire logistics and supply chain management in this belt and road initiative (Chan et al., 2019; Zheng, Xu and Wang, 2020; Cui et al., 2020). In contrast to this, the adoption of these technological innovations has remained the challenge for the companies that are dependent on the BRI to enhance their supply chain operations. It is due to the reason that there is a lack of infrastructure available for the integration and support of the technology in supply chain management for most of the businesses operating in different countries.

Although the advancement of technology has made it easier for companies to integrate their functions, however, there are specific challenges that remained firm concerning the adoption of technology. It has been argued in the study of Saberi et al. (2019) that lack of technological adoption has resulted in inefficient supply chain networks for most companies. Moreover, most countries do not have the appropriate infrastructure for supporting technology (Sepashvili, 2020; Tan, Ng, and Jiang, 2018; Ølnes and Jansen, 2017). Therefore, it leads the companies towards ineffective supply chain and logistics management despite having trade routes like belt and road initiatives. As per the study conducted by Ram and Zhang (2020), the technological

factors are necessary to be determined, which can enhance the logistics and supply chain management in the context of BRI. Therefore, the technological factors have been implied in this study, which depicts the effectiveness of these factors towards the LSCM in the context of BRI.

Furthermore, with respect to the motives of BRI, it is evident that they are most likely to have substantial influence over the management and configuration of the supply chain (Thürer et al., 2020; Butt and Ali, 2020). In addition to this, it can also help in terms of reducing the capacities of excess production, gaining access to the resources, and location decisions for the manufacturing units are directly associated with the supply chain management. Likewise, the integration of technology in the BRI concerning logistics and supply chain management will also increase the effectiveness of the supply chain function in the companies (Park and Dossani, 2020; Lee and Shen, 2020). In contrast to this, the associated benefits are less emphasised by the scholars of supply chain management, which creates a gap in the existing literature. The major problem is associated with a lack of technological integration in the LSCM within belt and road initiatives, which causes inefficiency (Chan et al., 2019). The objective of this study is to determine the factors of technological innovation.

Additionally, this study also determines the effect of technological innovation on the LSCM in BRI, along with the moderation of adoption and diffusion. The results of this study are beneficial for the companies in terms of making the supply chain and logistics function of the business more agile. The research question which has been answered in this study is provided below:

- *What is the effect of technological innovations on the logistics and supply chain management (LSCM) of BRI in the moderation of adoption and diffusion?*

2. Literature Review

The advancement of technology has changed how most businesses operate (McLaughlin, 2017; Kumar, 2017; Jones, 2018). It is due to the reason that the integration of technology has made the functions of the company more effective, which provides them the cost benefits along with the efficiency. It has also been argued in the study of Frank, Dalenogare, and Ayala (2019) that the technological advancements have made the operations of the companies much better while increasing the connectivity among them. In a similar manner, technological innovations have been among the core concept, which is widely integrated into the supply chain functions of various companies. It is because the technological innovations are assumed to provide multiple benefits in the logistics and supply chain management of the companies (Seman et al., 2019; Kopyto et al., 2020; Tönnissen and Teuteberg, 2020). One of the significant benefits of technological innovations is the integration of the entire supply chain, which enhances the connectivity of the supply chain operations for the company (Wu et al., 2016; Haddud et al.,

2017; Min, 2019). In this manner, businesses can increase the transparency of transactions while increasing communication with the suppliers. Therefore, technological innovations are necessary and essential for the effective supply chain and logistics functions of the companies. In contrast to this, the BRI initiative has also provided the companies to ensure the efficient trade of goods while ensuring agile and lean supply chain management and logistics operations.

On the other hand, the other major issue associated with the adoption of technological innovations is a lack of available resources or expertise. Therefore, pertaining to the opportunities provided by the BRI, the companies must be able to capitalise on the opportunity to adopt the technological innovation by ensuring that they have an adequate amount of human resources that can support the technological innovations (Demirkan, 2018; Najafi-Tavani et al., 2018; Lee et al., 2019). It has been argued in the study of Temel and Durst (2020) that companies need to have skilled resources for supporting the integration of technological innovations. The BRI has provided immense opportunities for the companies due to which is essential for them to make use of the available infrastructure. However, this issue is also associated with the government's support as it is dependent on the regulatory authorities to provide support of infrastructure concerning the adoption of technological innovation (Markard, 2020; Wong et al., 2020; Janssen et al., 2020). In this regard, it is essential to consider the technological factors which provide immense benefit towards the logistics and supply chain management of the company.

The first factor of the technological innovation which has been determined is enterprise resource planning. It is due to the reason that there are immense benefits of the enterprise resource planning, which contributes towards the integration of supply chain functions along with the functions of other departments (Lai, Sun and Ren, 2018; Mostafa, Hamdy and Alawady, 2019; Litke, Anagnostopoulos and Varvarigou, 2019). It has been argued in the study of Essila (2018) that enterprise resource planning helps the company to integrate the supply chain operation along with other functions of the company. In this manner, the companies will be able to utilise all the available resources efficiently while reducing the operational cost in the entire process. On the other hand, enterprise resource planning (ERP) is also considered to provide time efficiency for the company as the transparency of operations provides real-time information to all the company departments. It has been stated in the study of Ram and Zhang (2020) that ERP is the factor that affects the logistics and supply chain management functions of the company. In this manner, the effect of ERP as the technological factor affecting the logistics and supply chain management in the context of BRI has been tested in this study. Therefore, the first hypothesis of the study with respect to the effect of ERP on the logistics and supply chain management in the context of BRI is provided below:

H_1: There is a significant effect of enterprise resource planning (ERP) on the logistics and supply chain management in the context of BRI.

On the other hand, big data (BD) has also been determined as one of the factors associated with technological innovations. It is due to the reason that most of the companies have inefficient supply chain management as they are not provided with an adequate amount of information. It has been argued in the study of Chang, Chen, and Lu (2019) that lack of data availability has caused the inefficiency in supply chain functions of the companies. The availability of the data allows the company to forecast the sales, due to which the company can procure or stock the appropriate amount of materials or finished goods (Jain et al., 2017; Pereira and Frazzon, 2020; Kumar, Shankar, and Aljohani, 2020). In this manner, the company can effectively make use of information through BD management.

In contrast to this, the company would require cloud storage for storing BD along with effective management of the BD. It has been stated in the study of Ram and Zhang (2020) that there is a massive influence of BD on the supply chain management and logistics functions of the company. In this manner, the effect of BD on the logistics and supply chain management of the companies within the context of BRI has been tested in this study. The second hypothesis with respect to the effect of BD on the logistics and supply chain management of the companies within the context of BRI is provided below:

H_2: There is a significant effect of big data (BD) on logistics and supply chain management in the context of BRI.

Another factor of technological innovation is determined as social media. Social media (SM) is one of the most emerging platforms which can also provide technological innovation within supply chain management (Aryal et al., 2018; Choi, Guo and Luo, 2020; Queiroz et al., 2020). It has been argued in the study of Singh, Shukla, and Mishra (2018) that SM can help companies in terms of increasing the efficiency of supply chain management. It is due to the reason that it allows increased connectivity with suppliers all over the world. In this manner, the connectivity of the entire supply chain function of the companies is enhanced.

Conversely, SM can also help the company determine the vendors from different parts of the world, which can benefit the company in procuring cost-effective materials. Therefore, it depicts how SM can influence the LSCM of the companies. It has been stated in the study of Ram and Zhang (2020) that there is a considerable influence of SM on the logistics and supply chain management of the companies. In this manner, social media's effect on logistics and supply chain management has been tested in this study. The third hypothesis of the study has been provided with respect to the effect of social media on logistics and supply chain management:

H_3: There is a significant effect of social media (SM) on the logistics and supply chain management in the context of BRI.

The other factor which represents technological innovation is artificial intelligence (AI). It is due to the reason that AI has emerged as a concept that is widely adopted all over the world and gained the attention of different companies because of its immense benefits (Issa, Sun and Vasarhelyi, 2016; Ghosh, Chakraborty and Law, 2018). It has been argued in the study of Ram and Zhang (2020) that AI has a significant influence over the logistics and supply chain management of companies. In this manner, the effect of AI has been tested on the logistics and supply chain management within the context of BRI. The fourth hypothesis of the study with respect to the effect of AI on logistics and supply chain management is provided below:

H_4: There is a significant effect of artificial intelligence (AI) over logistics and supply chain management in the context of BRI.

The last factor of technological innovation is determined to be blockchain (BKC) technology. The adoption of blockchain has provided immense benefits to companies all over the world as it integrates all the functions of the supply chain management along with increasing the transparency of operations (Kamble, Gunasekaran, and Arha, 2019; Dutta et al., 2020). It has been argued in the study of Ram and Zhang (2020) that there is a vast influence of BKC on the logistics and supply chain management of the company. In this manner, the fifth hypothesis of the study has been developed with respect to the effect of BKC technology on the logistics and supply chain management in the context of BRI. This hypothesis is provided below:

H_5: There is a significant effect of the blockchain (BKC) on the logistics and supply chain management in the context of BRI.

Furthermore, the adoption and diffusion (AD) in the supply chain management are determined to influence the technological innovations in the logistics and supply chain management of the company. The diffusion of the supply chain management is the measurement of the degree to which the firm can make technological advancements in the supply chain functions (Kim and Chai, 2017; Kwak, Seo, and Mason, 2018; Basheer et al., 2019). It has been argued in the study of Thürer et al. (2020) that the AD has moderation over the technological innovation in logistics and supply chain management of the company. In this manner, the moderation of AD has been tested over the association of technological innovation and logistics and supply chain management within the context of BRI. The sixth hypothesis of the study concerning the moderation of AD has been provided below:

H_6: There is a significant effect of moderation of adoption and diffusion (AD) among the association of technological innovation and logistics and supply chain management within the BRI.

3. Theoretical Framework

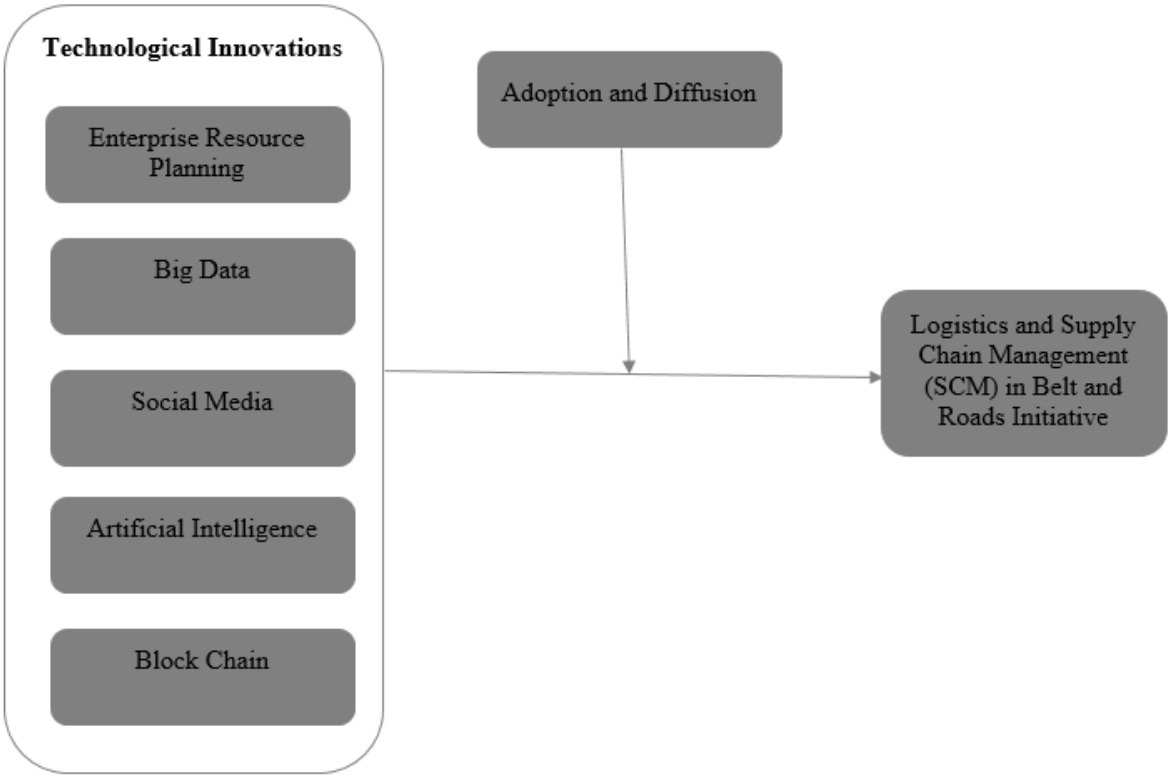
Since the study has focused on determining that either the technological innovations provide support to the logistics and supply chain management in the context of BRI, therefore, the diffusion of innovation theory has been employed in this study. It has been argued in the study of Miller (2015) that the diffusion of innovation theory was developed in 1962 by E.M. Rogers, which explains that how the product or idea gains momentum and diffuses with the help of a specific social system or population. In this manner, it relates to the adoption of technological innovations in the context of belt and road initiative as the technological innovations are diffused by the social system, which the belt and road initiative. The diffusion of technological innovation is dependent on the social system as various companies have to ensure the integration of technological innovations to increase the efficiency of logistics and supply chain in the BRI. Therefore, considering the benefits provided by the integration of technological innovation may influence the firms in order to increase the efficiency of logistics and supply chain function within the context of BRI.

4. Conceptual Framework

Below, Figure 1 depicts the conceptual model of the study, which has been considered for determining the effectiveness of technological innovation in support of the logistics and supply chain management concerning the BRI. In this manner, it is evident from the below Figure 1 that technological innovations are the independent variable of the study in which several control factors have been determined and has been tested as the model of this study. These factors involve ERP, BKC technology, AI, SM, and BD, which have been adopted from the study of Ram and Zhang (2020). On the other hand, the logistics and supply chain management in the context of BRI has been considered as the dependent variable of the study.

Moreover, the adoption and diffusion are regarded as the moderating variable in this study, which has been adopted from the study of Thürer et al. (2020).

Figure 1 Conceptual Model of the Study



5. Method

5.1 Research Design

Research design is commonly regarded as one of the most critical aspects of research methodology, as it covers the overall strategy that the researcher follows to integrate different components of the research in a more sound and logical manner (Leavy, 2017; Rahi, 2017). The researcher has made the use of quantitative research design in this study. The primary justification behind opting for quantitative research design was this study's nature, as it demands more fact-based data to identify the association between different variables of the study. Similarly, as mentioned in the study of Bloomfield and Fisher (2019), the quantitative research design is widely recognised as a more useful option for examining the association between the variables or the impact of one variable on another. Since the primary objective of this study was to determine the impact of technological innovations on LSCM, therefore, a quantitative research design was considered a more suitable option for this study. The nature of this study demanded statistical interpretation of data to identify the level to which different technological innovations can influence the SCM performance in the context of the Belt and Roads Initiative (BRI).

5.2 Data Collection

The methods and sources that are used for gathering data are considered as one of the most critical components of the study. According to Mkandawire (2019), the wrong selection of sources for data collection can make the study's findings invalid; thus, it is vital to ensure the proper use of data collection sources to make sure the reliability of research outcomes. The two of the most commonly used data collection sources are primary and secondary (Prada-Ramallal et al., 2018). In this study, the researcher has opted for the primary data collection method to collect the most relevant data to determine the influence of technological innovation on LSCM. Since the primary goal of this study has been to make a valuable contribution to existing literature, therefore, the researcher has followed the primary sources of data collection.

In the primary data collection method, the researcher has gathered the data by conducting a survey questionnaire. The sample size of the study has been 430, in which data was collected from the managers and employees from different organisations who have sufficient experience in the supply chain and logistics field. This has allowed the researcher to collect the most authentic and relevant data regarding the research topic.

Concerning the sampling technique, the researcher in this study has followed a convenience sampling technique. In this manner, the researcher has selected the study participants based on the availability of easy accessibility of the respondents. Moreover, to find an adequate sample size level, the researcher has used the formula mentioned in the study of Yuvaraja and Ramya (2019). The formula that is used for an appropriate level of sample size is provided below:

$$n = \frac{z^2 \times p \times q}{e^2}$$

$$n = \frac{(1.96)^2 \times 0.5 \times (0.5)}{(0.05)^2} = 384$$

As per the abovementioned calculation, the researcher has found 384 as the sufficient level of sample size for carrying out this study. In this regard, the questionnaire has been distributed to 450 respondents in the initial stages so that the final data can be gathered from an adequate level of sample size.

5.3 Research Instrument

The research instrument is regarded as a tool that is used in research to gather, analyse, and measure data related to the study's subject (Taber, 2018; Bunakov, 2018). The research instrument that the researcher has used in this study was a self-developed close-ended survey questionnaire. The survey questionnaire includes seven variables, and to measure the variables

of this study, the researcher has used a 5-point Likert scale ranging from strongly disagree to agree strongly. In this manner, all the independent, dependent, and moderating variables were quantified with numeric codes from 1 to 5.

4.3 Data Analysis Technique

The use of appropriate techniques for analysing the collected data is a crucial aspect of the study, as it determines the authenticity and reliability of research outcomes (Yuvaraja and Ramya, 2019; Taherdoost, 2016). In order to analyse the collected data, the researcher has used the technique of PLS-SEM modelling, which was done through SmartPLS since the data were ordinal did not follow a normal distribution. According to Akter, Fosso Wamba, and Dewan (2017), SEM modelling is probably the most useful and widely used technique for analysing quantitative data, as it helps the researcher examine the structural associations and in testing more complicated models. In SEM modelling, the researcher has also measured Confirmatory Factor Analysis (CFA) through carrying out composite reliability, Cronbach's alpha, factor loading, and AVE to test the reliability and validity of the model.

6. Results

6.1 Confirmatory Factor Analysis

Confirmatory factor analysis is a type of factor analysis, which is widely used in studies to measure whether or not the measure of constructs is consistent with the understanding of the researcher about the nature of those factors or construct (Sakib et al., 2020; Lewis, 2017). According to Pendergast et al. (2017), The tests of confirmatory factor analysis in studies are customarily conducted to assess the reliability of latent constructs and their convergent validity and discriminant validity. The CFA also includes the assessment of the factor's validity through factor loading. In accordance with the study of Shau (2017), factor loading is also considered as outer loading, which helps in ensuring the validity of all the constructs added in the model. As per the same study, the value of factor loading must be more than 0.6 to confirm the validity of each construct. Therefore, the researcher has followed the same criteria in this study. In this regard, the values of each construct are computed at more than the 0.6 threshold, which confirms the validity of all the constructs added to the model. Apart from that, to examine the reliability of all the variables, table 1 also highlights the values of composite reliability and Cronbach's alpha. According to Taber (2018), Cronbach's alpha and composite reliability are extensively used in studies to assess the internal consistency or reliability of test items. The same study identifies 0.7 as the most appropriate threshold for both measures, including composite reliability and Cronbach's alpha. Based on this criterion, all the composite reliability values and Cronbach's alpha in table 1 are figured at more than 0.7, which confirms the internal consistency in the scale items.

In CFA, the researcher has also conducted the test of AVE to analyse the relatedness of all the constructs with each other. As per the study of Rouhani and Chenari (2019), with respect to the value of AVE, anything above 0.5 proves the convergent validity of constructs. Hence, the same criteria have been followed in this study to measure the values of AVE. In this regard, all the AVE values highlighted in table 1 are more than 0.5, which is enough to prove the convergent validity of all the constructs.

Table 1 Confirmatory Factor Analysis

Latent Constructs	Indicators	Factor Loadings	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Adoption and diffusion	AD1	0.915***	0.910	0.943	0.847
	AD2	0.925***			
	AD3	0.920***			
Artificial Intelligence	AI1	0.898***	0.824	0.895	0.741
	AI2	0.876***			
	AI3	0.805***			
Big Data	BD1	0.864***	0.874	0.923	0.799
	BD2	0.926***			
	BD3	0.891***			
BlockChain	BKC1	0.925***	0.917	0.948	0.858
	BKC2	0.947***			
	BKC3	0.906***			
Enterprise Resource Planning	ERP1	0.915***	0.860	0.914	0.781
	ERP2	0.878***			
	ERP3	0.857***			
Logistics and SCM in BRI	LSCM1	0.957***	0.960	0.974	0.926
	LSCM2	0.966***			
	LSCM3	0.964***			
Social Media	SM1	0.927***	0.919	0.949	0.860
	SM2	0.937***			
	SM3	0.918***			

***: indicating significance at 1%

6.2 Discriminant Validity

In this study, the researcher has also measured the discriminant validity through the HTMT ratio to examine whether the measurements that are not supposed to be linked are actually

unrelated (Ab Hamid, Sami, and Sidek, 2017; Cheung and Wang, 2017). According to Ab Hamid, Sami, and Sidek (2017), the HTMT ratio values must be below 0.85 to prove the variables' discriminant. In this regard, all the values highlighted in Table 2 are computed below 0.85, which confirms the discriminant validity of all the variables.

Table 2 Discriminant Validity

	Artificial Intelligence	Big Data	BlockChain	Internal Enterprise Resource Planning	Adoption and diffusion	Logistics and SCM in BRI	Social Media
Artificial Intelligence							
Big Data	0.846						
Block Chain	0.813	0.790					
Enterprise Resource Planning	0.741	0.836	0.699				
Adoption and diffusion	0.784	0.833	0.743	0.791			
Logistics and SCM in BRI	0.782	0.774	0.785	0.725	0.744		
Social Media	0.756	0.794	0.656	0.689	0.878	0.715	

6.3 Model Assessment

The figures presented in Table 3 depicts the quality assessment of the model. The R-square value highlights the percentage of variance on the dependent variable. In this regard, as per the value of R-square highlighted in table 3, all the independent variables and moderating variables of this study explain 68% of the variance in logistics and SCM in BRI. On the other hand, adjusted R-square represents the value after adjusting the statistics on the basis of the number of independent variables in the model, which is computed at 67.1%. Moreover, to determine the predictive relevance of the model, the test of blindfolding was also conducted to obtain Q-square. As per the findings of this study, Q-square was computed at 0.671, which confirms the existence of predictive relevance in the model.

Table 3 Model Assessment

	R Square	R Square Adjusted	Q-square
Logistics and SCM in BRI	0.680	0.671	0.601

6.4 Path Assessment

The results presented in Table 4 show the level of association between all the variables of this study. As per the findings of path assessment, all the independent variables including artificial intelligence, big data, blockchain, enterprise resource planning, and social media are found to have a significant impact on logistics & SCM in BRI, as the p-values of all the variables are found to be less than 0.05. However, with respect to the moderating variable, there is no association has been found between AD and logistics & SCM in BRI, as the p-value was figured at 0.635. Moreover, as per the findings of path assessment, IIS significantly moderates the association between big data and logistics & SCM in BRI, as the p-value was computed at 0.000. Similarly, the moderating variable of IIS was also found to significantly moderates the association between ERP and logistics & SCM in BRI and also between SM and logistics & SCM in BRI. In contrast, the variable of IIS has been found to have no significant moderating effect on the association between AI and logistics & SCM in BRI, and also between BC and logistics & SCM in BRI.

Table 4 Path Assessment

Path	Path Coefficient	T Statistics	P Values
Artificial Intelligence -> Logistics and SCM in BRI	0.142***	2.802	0.005
Big Data -> Logistics and SCM in BRI	0.170***	3.319	0.001
Block Chain -> Logistics and SCM in BRI	0.335***	6.241	0.000
Enterprise Resource Planning -> Logistics and SCM in BRI	0.113**	2.437	0.015
AD*AI -> Logistics and SCM in BRI	-0.047	1.049	0.294
AD*BD-> Logistics and SCM in BRI	0.184***	3.866	0.000
AD*BKC -> Logistics and SCM in BRI	0.015	0.341	0.733
AD*ERP -> Logistics and SCM in BRI	-0.086**	2.062	0.039
AD*SM-> Logistics and SCM in BRI	-0.071**	1.972	0.049
Adoption and diffusion -> Logistics and SCM in BRI	0.028	0.475	0.635
Social Media-> Logistics and SCM in BRI	0.157***	3.066	0.002

***: significant at 1%; **: significant at 5%

7. Discussion

The primary aim of this research has been to investigate how new technological advancements can support logistics and supply chain management. In order to answer this question, the

critical analysis of primary data has been made in the previous section. Based on the overall analysis of results, it has been found that technological innovation holds enormous importance for supporting logistics and supply chain management activities. Based on this study's findings, all the independent variables, including social media, artificial intelligence, blockchain, big data, and enterprise resource planning, are found to have a significant impact on logistics and SCM in BRI. This finding is also found to be consistent with most of the previous studies. The study conducted by Mostafa, Hamdy, and Alawady (2019), identifies enterprise resource planning as an essential technological determinant that can make a positive contribution towards the integration of supply chain functions along with the functions of other departments.

On the other hand, the study carried out by Pereira and Frazzon (2020) identifies a significant association between big data and logistics and supply chain management performance, as the availability of data enables the company to forecast sales, which allows the company to stock sufficient amount of finished goods or materials. The findings of this study also reveal the significant moderating effect of adoption and diffusion on the association between big data and Logistics & SCM in BRI. Moreover, the variable of AD was also found to have a significant moderating effect on the association between ERP and logistics & SCM in BRI, and also between SM and logistics & SCM in BRI.

8. Conclusion

The overall discussion and analysis presented in this study signify the enormous importance of technological innovations for effective LSCM. The primary goal of this study has been to determine how technological innovation can support logistics and supply chain management. The research investigation scope has been restricted to the LSCM of Belt and Roads Initiatives (BRI). To accomplish the primary aim of this study, the researcher has conducted an extensive review of previous literature and the collection of primary data through a survey questionnaire. As per the comprehensive review of previous literature, some major technological innovations have been identified that can have a significant influence on logistics and supply chain management functions, which include social media, blockchain, big data, artificial intelligence, and enterprise resource planning. All these factors of technological innovations were taken as independent variables of this study, the impact of which has been examined on logistics and supply chain management functions. Apart from that, the moderating effect of adoption and diffusion has also been assessed on the relationship between technological innovation and LSCM activities. To attain the critical objectives of this study, the researcher has used SEM modelling technique, which helps in examining the association between technological innovation and LSCM. The outcomes of this research confirm the significant impact of all the independent variables on the LSCM in the context of belt and road initiatives. Conversely, the findings of this study reveal the significant moderating effect of adoption and diffusion on the association between BD and logistics & SCM in BRI. Furthermore, the findings also prove the

significant moderating effect of AD on the association between SM and logistics & SCM in BRI, and also between ERP and logistics & SCM in BRI.

9. Recommendations

Based on the overall outcomes of this study, the following recommendations are proposed:

- The concerned authorities that are involved in the belt and road initiatives are advised to focus on establishing trust among all the participants, as it plays a pivotal role in ensuring the effectiveness of supply chain functioning. In this regard, blockchain technology can be leveraged to establish trust, as in blockchain, every participant tends to have access to all the essential information.

- It has also been recommended to authorities to make effective use of Artificial Intelligence in logistics and supply chain management. In this manner, AI can be used to manage autonomous transportation, forecast product demand, and enhance routing efficiency.

- The authorities are also advised to make effective use of big data to enhance the effectiveness of supply chain activities. In this manner, analytics reports can be used to improve decision making, which will help in achieving operational efficiency and monitoring performance to enhance productivity.

- In order to gain benefits from new technological innovation, companies need to emphasise the process of adoption and diffusion process of new technology. For that purpose, organisations are required to maintain the right pace of technology adoption based on organisational structure, firm size, past financial performance, transaction environment, and integration of supply chain strategy corporate strategy.

10. Future Research

The limited scope of this research has been one of the significant limitations of the study, as this study was carried out in the context of Road and Belt Initiatives (RBI). Therefore, future researchers are advised to broaden this study's scope by adding multiple research investigation activities. In this regard, future researchers can also consider adding more variables to investigate new technological innovations, collaborative mobile robots, and geolocation technologies. On the other hand, this study also lacks qualitative data, which also affects the quality of research findings, as gaining an in-depth understanding from human perspective and opinion may offer more useful insights about the research topic. Hence, in the future, the same study can be carried out with a mixed research design to make a valuable contribution to the

existing literature. This will also help the researcher to ensure the reliability and validity of research outcomes.

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APPENDIX: SURVEY QUESTIONNAIRE

Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Artificial Intelligence (AI)					
Artificial intelligence makes the significant and positive impact on logistics and supply chain activities					
AI offers contextual intelligence, which can be used to manage inventory and reduce operating costs.					
The use of AI is useful insights regarding different areas, including logistics and supply chain management and warehouse management.					
Blockchain (BKC)					
Blockchain can significantly influence the logistics and supply chain management practices.					
Blockchain allows more accurate and transparent end to end tracking in the supply chain.					
Use of blockchain helps in digitizing physical assets, making it possible to track assets from production to delivery.					
Big Data (BD)					
Big data analytics plays a crucial role in improving supply chain management.					
Analytics reports help decision-makers to achieve operational efficiency and					

monitor performance to enhance productivity.					
The use of big data plays a pivotal role in enhancing service levels and reducing costs.					
Social Media (SM)					
The use of social media holds colossal importance for effective logistics and supply chain management functioning.					
The use of social media can enhance overall processes, increase efficiency, and mitigate risk.					
Social media plays an essential role in enhancing communication among different participants involved in supply chain management.					
Enterprise Resources Planning (ERP)					
ERP makes a significant and positive impact on logistics and supply chain management functioning.					
The use of ERP helps an organisation to effectively manage business information, streamline workflows, integrate several disparate systems, and achieve efficiency.					
ERP is the backbone of an organisation's information systems.					
Adoption and Diffusion (AD)					
Adoption and diffusion of new technology innovations determine its					

influence on logistics and supply chain management practices.					
The rapid diffusion of new technology innovation has a significant influence on different functions of supply chain management.					
Adoption of new technology depends on the perceived usefulness of new technology.					
Logistics and Supply Chain Management (LSCM) in Belt and Roads Initiatives (BRI)					
The use of emerging technology innovation is crucial for logistic and supply chain management in Belt and Roads Initiatives.					
The use of technology innovation can bring operational efficiency in the logistics and supply chain management in Belt and Roads Initiatives.					
Technology innovation can support logistics and supply chain management in Belt and Roads Initiatives.					