

# Factors Affecting Digital Transformation in Logistic Firms

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## Abstract

**Purpose-** The main purpose of this study is to analyse the factor affecting DT in Indian logistic firms.

**Design/methodology/approach-** Present study collects quantitative by distributing the questionnaire to the participant. In addition proposed hypothesis was tested using PLS-algorithm along with bootstrapping method.

**Findings-** Findings confirm that OC, LOR positively influence DT and RTC, EE and CTI does not influence DT.

**Research limitations/implications-** Results discussed in this paper will help firms manager and policy maker to adopt DT in digital economy.

**Originality/value-** No prior study empirically investigates the influence of OC, LOR, RTC, EE and CTI on DT..

**Keywords-** Organisation culture, lack of resources, digital transformation, capability, innovation, employee engagement

## 1. Introduction

In this digital age, digital transformation (DT) is becoming a tool to get competitive advantage over others (Singh et al. 2021). The rapid advancement of digital technologies have changed the competitive dynamics of logistics industries (Cichosz et al. 2020). According to Muhammad and Anton (2022), logistics is the supply chain service industry in transporting and delivering goods. Digitalisation in logistic firms is an increasingly popular topic among scholars (Herold et al. 2021). Digitalisation plays a major role in logistic firms and many scholars have discussed its potential for economies and societies (Herold et al. 2021; Cichosz et al. 2020; Atumonye, 2022). DT in logistic firms integrate digital technology into business models of logistic operations to enhance efficiency and customer satisfaction. By leveraging DT, logistic firms can stay competitive over others. Singhdong et al. (2021) stated that DT in logistic firms shows an growing trend. Businesses from every sector are now focusing and adopting DT and reshape their business models with DT trends.

Currently, Indian logistic firms often deals with complex supply chains, involving multiple stakeholders, locations, and modes of transportation. Moreover, India has witnessed a significant rise in e-commerce activity, with increasing numbers of consumers relying on online shopping. To cater to this growing market, logistics firms need to adopt digital solutions that enable seamless integration with e-commerce platforms, automate order processing, and support last-mile delivery. DT allows logistics firms to meet the unique demands of the e-commerce sector effectively. In this context reshaping traditional process and migrating to new digital platforms for logistic firms can be an effective solutions to gain a competitive advantage (Egorov et al. 2020). DT enables logistic firms to drive efficiency and lower cost as well as pursue new business opportunities (Shadibekova and Ismoilov, 2021). Taufani and Widjaja (2022) found that DT in logistic firms embrace firm performance. On the other hand, DT provides many benefits such as increasing efficiency, enhancing customer experience, managing complex supply chains etc.

The adoption rate of DT among Indian logistic firms are low, however many Indian logistic firms have embraced DT. To compete in logistics market, Indian logistic firms need to adopt DT (Tran et al. 2023). There are many factors that hinder the logistics firm to adopt DT. In this current study, these factors are examined in the context of adoption of DT in Indian logistics firm. So far conceptual studies are available pertain to factors and barriers associated with DT in logistics firm worldwide (Cichosz et al. 2020; Tran et al. 2023; Herold et al. 2021; Kopishynska et al. 2021). However, limited studies are also available concerning factors influencing DT in logistics firm worldwide (Viet and Quoc et al. 2023; Tran et al. 2023). Still holistic framework of adopting of DT in logistics firms in Indian context are missing which was a major research gap and was closed by this study. This study makes two important contributions to the existing literature. First, focusing on DT in logistics firms in Indian context and second identifying the influencing factor of DT in Indian logistics firms. Consequently, this study has a potential to offer practical implications to the logistic managers on how to establish and retain the presence in digital economy.

## 2. Literature review and hypothesis development

### 2.1 Organisation culture and digital transformation

Over the past two decades, scholars have paid attention to organisation culture (Trushkina et al. 2020). OC plays an important role in the success of DT in any firms. OC is an intangible asset of firm and strength of firm (Phan, 2021). Pillay et al. (2012) acknowledged the role of OC in organizational transformation. Nowadays it is widely accepted that by utilizing DT firms can gain competitive advantage. However, OC is a pre-requisite for the success of DT (Pradana et al. 2022). To adopt DT, firms need to change its OC but it must be determined that change to meet the requirement is must (Phan, 2021). Changing of OC is one of the biggest hurdle for the firms to adopt DT (El Rashied, 2022). Therefore OC cannot be ignored during DT (El Din, 2023). When it comes to digital transformation in logistics organizations, fostering a supportive organizational culture is crucial. By cultivating an organizational culture that embraces innovation, collaboration, customer-centricity, and learning, logistics organizations can create an environment conducive to successful digital transformation. Such a culture supports employees in adopting new technologies, adapting to change, and driving positive outcomes in their digital journey (Al-Balushi, 2020). Al-Balushi (2020) found that OC of logistic firms in Oman is closely linked with DT. The study of Singh et al. (2021) in manufacturing sector found that OC do no influence DT. Pradana et al. (2022) also found that digital OC influence DT. Likewise, Lan (2021) revealed the importance of corporate culture on DT in Vietnam Businesses. Therefore, based on the above arguments we claimed that

H1. OC positively influence DT

### 2.2 Lack of resources and digital transformation

Cichosz et al. (2020) found that lack of resources (LOR) is a second factor which influence the adoption of DT. Aziz et al. (2015) found that resources of logistic firms are a source of competitive advantage. Logistics firm are often struggle with lack of time, money and digitally skilled employees. These skills jeopardize the journey of DT in firms (Gupta, 2018). Aziz et al. (2015) found that Logistics firm are often lacked with physical resources such as equipment's for warehousing, inventory and transportation. The lack of resources is the biggest factor that influence DT in logistics firm. Further, implementing DT in firms is associated with higher cost, logistic firms are often struggle with financial constraints. DT demands the availability of skilled IT employees however, logistic firms are also struggling with the shortage of highly skilled IT employees. The study of Chwiłkowska-Kubala et al. (2023) in energy sector found that limited access to specific resource can slow down the implementing process of DT. Likewise, the study of Viet and Quoc et al. (2023) in Vietnam logistics enterprises found that investment cost in DT has a significant impact of DT activities in logistics firm. Reis et al. (2018) found that IT skills in employees influence the computerization of logistics operations which in turn affect DT. Viet and Quoc et al. (2023) also highlighted that digital skills in employees is necessary for logistic firms undergoing DT. Therefore, based on the above arguments we claimed that

H2. LOR positively influence DT

### 2.3 Resistance to change and digital transformation

DT in firms begins with change. Researchers agreed that change process itself is a complex one (McConnell, 2018; Gupta, 2018). Previous literature mentioned that resistance to change (ROC) is a third factor that plays a major role in firms undergoing DT (Cichosz et al. 2020). Hizam et al. (2023) stated that humans has maintained a resistance to change approach for DT. Resistance to change is a major challenge in a firm undergoing DT (Vercic et al. 2022). Previous studies elaborate ROC in different perspectives. Scholkmann (2021) found that employee resistance to change is a main factor for firms to adopt DT. However, Cichosz et al. (2020) found that employee resistance to change is less related with logistic firms. Moreover, Cichosz et al. (2020) stated that 'fear of failure' is a major problem in service industry including logistic firms which reflects the inability to perform experiment. DT in firms are failed due to employee resistance to change (Gupta, 2018). Viet and Quoc et al. (2023) found that when employees are willing to change they learn new skills, apply technology which ultimately affect the success of DT. Sen and Gupta (2020) studied the attitude of employee towards change management in digitalization in an organisation. Therefore, based on the above arguments we claimed that

H3. ROC positively influence DT

### 2.4 Employee engagement and digital transformation

Employee engagement (EE) plays an important role in the successful implementation of DT. ENG is essential for the firms to undergoing DT (Dery et al. 2017). Accessing EE is essential in the DT era (Hizam et al., 2023). Cichosz et al. (2020) found that EE is the most essential factor for DT. Moreover, Cichosz et al. (2020) engaging employees in DT is more advantageous as it limits resistance to change. Engaged employees tend to exhibit higher levels of performance and productivity. When employees feel engaged and connected to the organization's goals, they demonstrate increased motivation, commitment, and discretionary effort. This leads to enhanced efficiency, effectiveness, and overall performance in executing

digital transformation initiatives, resulting in improved outcomes for the logistics firm. Goswami and Upadhyay (2019) stated the to meet the challenges of DT, firms need highly engaged and motivated employees at all stages of implementation. Engaged employees support and encourage their colleagues throughout the DT process, helping to build a positive culture that embraces change and the opportunities that DT brings. Therefore, based on the above arguments we claimed that

H4. EE positively influence DT

### 2.5 Capability to innovate and digital transformation

The market of logistics and transport increases as a result more and more logistics and transport players enter into the market to capture the market share. The capability of logistic firms to innovate is directly related to DT. As per the resource based view theory (RBV) logistic firms can utilise their resources and capabilities to gain competitive advantage (Wang et al. 2020). In this competitive world, firms need to innovate and their capability relate with the success of DT (Nwankpa and Roumani, 2016). Logistic firms can leverage their capability to embrace DT. Firms need to invest in DT and innovation capabilities to gain competitive advantage and higher profit. Wang et al. (2020) stated that innovation capability of logistics improve logistic operations and gains a market share. Dovbischuk (2021) found that logistic firm's capability to innovate influence dynamic resilience which in turn affect firm performance. Therefore, based on the above arguments we claimed that

H5. CTI positively influence DT

Therefore, based on literature review, a conceptual framework has been developed as shown in Figure 1.

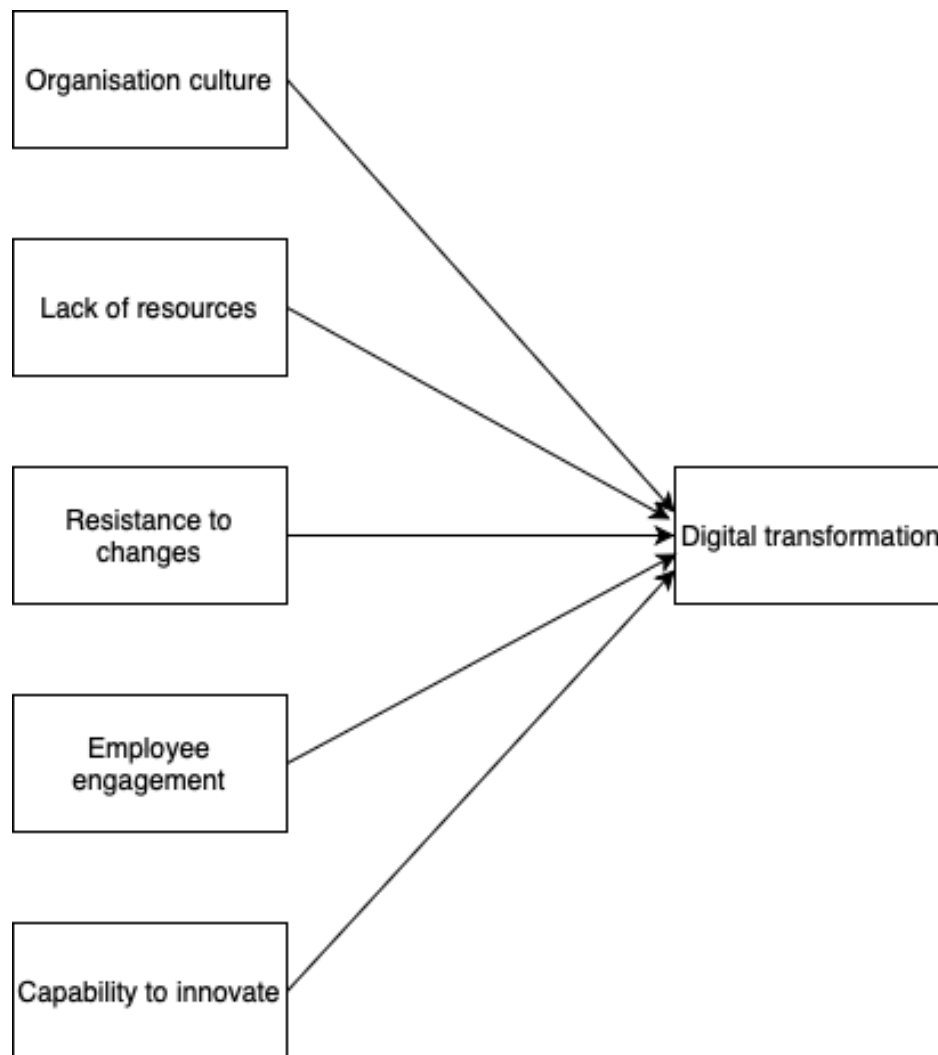


Figure 1. Conceptual framework

### 3. Research methodology

#### 3.1 Sample, sample size and sampling technique

To test the conceptual framework, we developed a structured questionnaire and carried out a self-administered survey at Indore city. In a survey the owners of a logistic firms are participated. A quantitative data was collected based on non-probability convenience sampling technique. The main advantage of using convenience sampling is that it can assess respondents who are willing to participate in a survey. The study was conducted from November 2022 to March 2023. Total 542 questionnaire was distributed to the participants from which 367 responses were received. A total of 23 questionnaires were removed from the sample results in a sample size of 344 which was used for the analysis of dat. The demographics summary is shown in Table 1. Based on Table 1, it is observed that, 83.7% respondents are male and 16.2% respondents are female. Majority of respondents (53.4%) are bachelors.

**Table 1.** Demographics summary

Variable	Frequency (%)
Gender ( <i>n</i> =344)	
Male	288(83.7)
Female	56(16.2)
Age ( <i>n</i> =344)	
25-30	4(1.16)
31-35	135(39.2)
36-40	107 (31.1)
Above 40 years	98(28.4)
Education ( <i>n</i> =344)	
Diploma	29(8.4)
Bachelors	184(53.4)
Masters	98(28.4)
PhD	33(9.5)

#### 3.2 Measures

In this study all the instruments to measure the variables considered, were adapted from the previous literature. All the items were based on five point Likert scale.

**3.2.1 Organisation culture.** A six-item scale to measure organisation was adopted from the study of Dasgupta and Gupta (2019). A sample item of this scale include “*The employees give inputs to the decisions that affect them*”.

**3.2.2 Digital transformation.** A three-item scale to measure digital transformation was measured from the study of Aral and Weill (2007). A sample item of this scale include “*The new business processes built on technologies such as big data, analytics, cloud, mobile and social media platform*”.

**3.2.3 Lack of resources.** A four-item scale to measure lack of resources was measured from the study of Viet and Quoc (2023). A sample item of this scale include “*Cost of new technology*”.

**3.2.4 Resistance to change.** A four-item scale to measure resistance to change was measured from the study of Viet and Quoc (2023). A sample item of this scale include “*Readiness to change*”.

**3.2.5 Employee engagement.** A five-item scale to measure employee engagement was measured from the study of Cichosz et al. (2020). A sample item of this scale include “*Programs communicating DT vision and goals*”.

**3.2.6 Capability to innovate.** A four-item scale to measure capability to innovate was measured from the study of Viet and Quoc (2023). A sample item of this scale include “*Hardware and network system*”.

### 3.3 Data analysis

In this study, the proposed hypothesis was tested using PLS-algorithm along with bootstrapping method. The data analysis was done in two steps. In first step, structural model assessment has been done in terms of evaluating reliability and validity of instrument and in second step hypothesis testing was done.

#### 3.3.1 Structural model assessment

Structural model assessment has been done by accessing certain parameters such as Cronbach's alpha, Composite reliability (CR) and Average Variance Extracted (AVE). First the loadings of each items were evaluated and was found statistically significant, and all were above the threshold value. The Cronbach's alpha and Composite reliability (CR) of constructs have been examined. From Table 2 the range of Cronbach's alpha is 0.770 to 0.862 and range of CR is 0.867 to 0.893. which is above the 0.7 as suggested by Hair et al. (2011). Thus it indicates that scale is reliable. Next, we evaluate the AVE of each items, from Table 2 the obtained values of AVE is above 0.5 as suggested by Hair et al. (2014). At last, using Fornell–Larcker criteria discriminant validity was also examined. From Table 3, the square root of AVE is greater than the inter-item correlations. Hence, this study also confirms the discriminant validity.

**Table 2.** Measurement model assessment

Variable	Items	FL	$\alpha$	CR	AVE
Organisation culture	OC1	0.778	0.862	0.897	0.593
	OC2	0.785			
	OC3	0.789			
	OC4	0.795			
	OC5	0.737			
	OC6	0.734			
Digital transformation	DT1	0.867	0.770	0.867	0.687
	DT2	0.887			
	DT3	0.724			
Lack of resources	LOR1	0.796	0.837	0.891	0.672
	LOR2	0.827			
	LOR3	0.856			
	LOR4	0.801			
Resistance to change	RTC1	0.796	0.840	0.893	0.675
	RTC2	0.824			
	RTC3	0.842			
	RTC4				
Employee engagement	EE1	0.765	0.844	0.889	0.616

Capability to innovate	EE2	0.761			
	EE3	0.817			
	EE4	0.797			
	EE5	0.781			
	CTI1	0.805	0.821	0.882	0.651
	CTI2	0.804			
	CTI3	0.807			
	CTI4	0.811			

**Table 3.** Discriminant validity using Fornell–Larcker criteria

Constructs	CTI	DT	EE	LOR	OC	RTC
CTI	<i>0.807</i>					
DT	0.631	<i>0.829</i>				
EE	0.787	0.673	<i>0.785</i>			
LOR	0.647	0.730	0.691	<i>0.820</i>		
OC	0.697	0.788	0.697	0.762	<i>0.770</i>	
RTC	0.670	0.730	0.749	0.764	0.784	<i>0.822</i>

Note: Correlation is significant at 0.05, figures in italics represent square root of AVE

### 3.3.2 Hypothesis testing

The next step is to test the proposed hypothesis using PLS algorithm along with bootstrapping method. Table 4 shows the summary of hypothesis testing along with SEM model (Figure 2.) From Table 4, it is observed that OC ( $\beta = 0.432, t = 5.118, p = 0.000$ ) and LOR positively influence DT ( $\beta = 0.208, t = 2.081, p = 0.038$ ). Thus, H1 and H2 is supported. On the other hand, RTC ( $\beta = 0.139, t = 1.755, p = 0.08$ ), EE ( $\beta = 0.115, t = 1.322, p = 0.187$ ) and CTI ( $\beta = 0.012, t = 0.154, p = 0.878$ ) does not influence DT. Thus, H3, H4 and H5 is not supported.

## 4. Discussion

This study empirically test the proposed framework and examine the factors that influence DT in Indian logistic firms. Our research framework shows informative findings explained below. First the findings indicate that OC influence DT (H1). This implies that OC support in successful implementation of DT. A culture that promotes innovation and encourages employees to take risks is more likely to embrace digital transformation. When employees are empowered to experiment with new technologies and approaches, they are more likely to adopt and adapt to digital solutions. It's important to note that cultural change is not always easy and can take time. However, by aligning the organizational culture with the goals and requirements of digital transformation, logistics firms can create an environment that supports and accelerates their digital initiatives. The findings of this study is contradicted with the finding of Singh et al. (2021) who found that OC has an insignificant influence on DT in manufacturing sector.

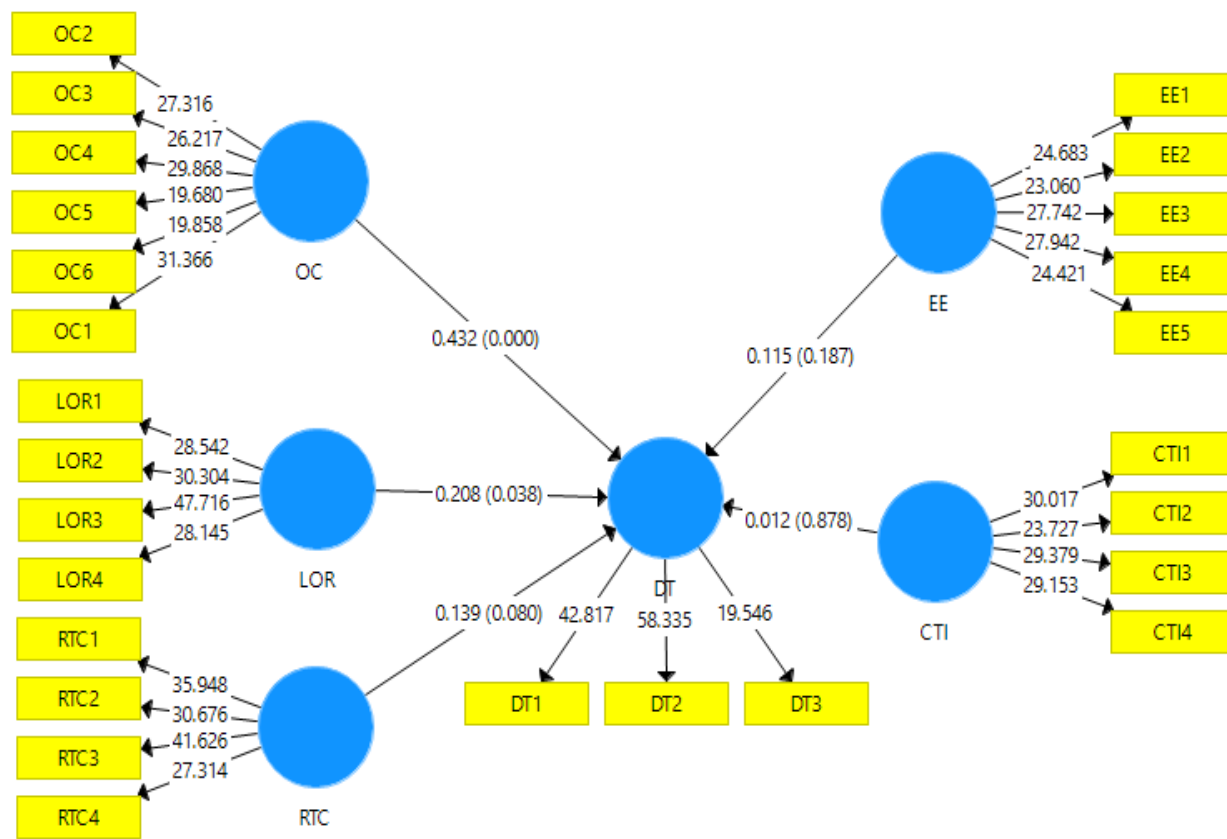


Figure 2. SEM model

Table 4. Summary of hypothesis testing

Hypotheses	Path	$\beta$	t-value	p-value	Test outcome
1	OC → DT	0.432	5.118	0.000	Significant
2	LOR → DT	0.208	2.081	0.038	Significant
3	RTC → DT	0.139	1.755	0.080	Not significant
4	EE → DT	0.115	1.322	0.187	Not significant
5	CTI → DT	0.012	0.154	0.878	Not significant

Second, the impact of LOR has a positive a significant influence on DT. This suggest that LOR is a pre-requisite in the successful implementation of DT. Logistic firms evaluate their resources and implement DT. Implementing DT initiatives often requires significant investments in technology infrastructure, software systems, training, and talent acquisition. If a logistics firm lacks the necessary financial resources, it may struggle to fund and support the adoption of digital solutions. DT typically relies on robust and modern technology infrastructure, such as cloud computing, data analytics platforms, and connectivity solutions. If a logistics firm lacks the necessary resources to upgrade or invest in such infrastructure, it may face limitations in implementing digital technologies effectively. DT requires a workforce with the necessary skills and expertise to understand, implement, and leverage digital tools and technologies. However, logistics firms with limited resources may find it challenging to recruit or train employees with the required digital skills. This can slow down or hinder the adoption of digital solutions. The findings of this study is contradicted with the finding of Viet and Quoc et al. (2023) who stated that human resources, cost and IT infrastructure have a significant impact on DT activities in logistic firms in Vietnam.

Third, the impact of RTC has an insignificant influence on DT. This suggests that some logistics firms in India may face resistance to change, others may have successfully overcome it or have a more receptive environment for digital transformation. The logistics industry in India is highly competitive, with numerous players vying for market share. Firms that recognize the importance of DT in gaining a competitive edge are more likely to overcome resistance and actively pursue digital initiatives. The fear of falling behind competitors and losing market relevance can outweigh resistance to change. Employees within Indian logistic firms may resist change due to various reasons, such as fear of job loss, unfamiliarity with new technologies, and concerns about increased workloads or changes to job roles. This resistance can slow down or hinder the adoption of digital solutions, as employees may be reluctant to embrace and fully utilize the new tools and processes.

Fourth, the impact of EE has an insignificant influence on DT. EE remains a valuable factor for successful DT in Indian logistic firms. Indian organizations, including logistic firms, may have hierarchical cultures that limit employee empowerment and involvement in decision-making processes. In such environments, employees may have limited opportunities to contribute their ideas and take ownership of DT initiatives, which can hinder the influence of EE. Indian organizations, including logistic firms, may exhibit a higher level of resistance to change due to cultural factors, risk aversion, or a preference for established practices. This resistance can impede the adoption of digital technologies, even among engaged employees who may be more receptive to change. Overcoming resistance to change is crucial for the influence of EE on DT. DT often requires new skills and capabilities. However, some Indian logistic firms may face challenges in providing adequate training and development opportunities to equip employees with the necessary digital skills. Without the right skills, even engaged employees may struggle to drive meaningful change through DT. Indian logistic firms, particularly smaller or mid-sized ones, may face resource constraints that limit their ability to invest in digital transformation initiatives. Limited financial resources, technology infrastructure, or access to external expertise can hamper the influence of employee engagement on DT efforts.

Fifth, the impact of CTI has an insignificant influence on DT. Some logistic firms in India may have limited awareness or exposure to the full range of digital technologies available for transformation. This can hinder their ability to identify innovative solutions or explore the potential of emerging technologies. Lack of exposure to digital innovations can dampen the influence of innovation on DT efforts. Logistic firms in India, particularly smaller or mid-sized ones, may face resource constraints that limit their ability to invest in innovative digital solutions. Limited financial resources, technology infrastructure, or access to skilled talent can hinder the capability to innovate and thereby limit the impact on DT. The logistics sector in India faces specific regulatory and infrastructural challenges, such as complex compliance requirements, fragmented infrastructure, and varying levels of technological maturity across different regions. These challenges can make it more difficult for logistic firms to innovate and adopt digital technologies at scale, reducing the immediate influence of innovation on DT.

## **5. Theoretical implications**

From the theoretical perspective current study contributes to the body of literature. First, as per the author knowledge, there is a limited research concerning the factors affecting DT in Indian logistic firms. Suggesting the need for studies to analyse the factors affecting DT in Indian logistic firms. Therefore, current study considered the Indian logistic firms to examine the importance of factors affecting DT. First this study showed that OC and LOR influence DT. OC plays a crucial role in shaping how employees and the organization as a whole approach and embrace digital transformation. A culture that values innovation, adaptability, collaboration, and continuous learning can foster an environment conducive to successful digital transformation. On the other hand, a culture that resists change, is risk-averse, or lacks a focus on innovation can impede digital transformation efforts. The attitudes, behaviors, and values prevalent within an organization's culture can influence the willingness of employees to adopt new technologies and processes, as well as their ability to collaborate and drive the transformation forward.

The availability of resources, including financial, technological, and human resources, is a critical factor in the successful implementation of digital transformation initiatives. Digital transformation often requires investments in technology infrastructure, software systems, training, and talent acquisition. Without sufficient resources, logistics firms may struggle to fund and support the adoption and integration of digital solutions. Limited resources can hinder the ability to implement necessary technological upgrades, hire skilled personnel, and provide the training required for digital transformation.

Second this study showed that RTC, EE and CTI does not influence DT. Future research can be benefited from this finding by conducting a systematic investigation or expand sample size. Resistance to change is a common challenge in any organization undergoing significant transformation, including digital transformation. In Indian logistic firms, resistance to change can arise due to cultural factors, risk aversion, or concerns about job security. This resistance can hinder the adoption and implementation of digital technologies. Overcoming resistance to change through effective change management strategies, communication, and employee involvement is crucial for successful digital transformation. Engaged employees are more likely to embrace and actively participate in digital transformation initiatives. Their ownership, commitment, and willingness to learn new skills can accelerate the integration of digital technologies within logistic firms. Engaged employees are also more inclined



to collaborate, share knowledge, and contribute innovative ideas, which can have a positive impact on the success of digital transformation efforts.

The capability to innovate is vital for successful DT. In the Indian logistic sector, the ability to innovate can lead to the identification of new ways to leverage technology, streamline processes, and enhance efficiency. Innovation can also drive the exploration and implementation of emerging technologies that offer transformative benefits. Building a culture of innovation, encouraging creativity, and providing resources and support for innovation are important factors for leveraging the capability to innovate in DT initiatives.

## 6. Managerial implications

This study has certain managerial implications which can be useful for the owners of logistic firms. First, firms manager clearly communicate the reasons, benefits, and goals of DT to employees. Help them understand how it aligns with the organization's vision and strategy. Further, firms manager ensure leadership is actively involved in promoting and supporting DT initiatives. Leaders should serve as role models and provide guidance, encouragement, and resources to overcome resistance. Overcoming resistance to change through effective change management strategies, communication, and employee involvement is crucial for successful DT. Second, firms manager implement effective change management strategies that involve employees in the process. Involve them in decision-making, provide training and support, and address concerns and fears related to job security and workload changes. Third, firms manager, foster a culture that values collaboration, open communication, and employee empowerment. Create opportunities for employee involvement in decision-making and encourage a sense of ownership and accountability. Building a culture of innovation, encouraging creativity, and providing resources and support for innovation are important factors for leveraging the capability to innovate in digital DT initiatives.

## 7. Limitations and future scope

The current study has several limitations. First, the sample population of current study is limited to Indore which does not represent the entire population of India. To deal with this issue future study can be conducted across different locations of India. Second, this study is based on cross-sectional research design, future study can be conducted by incorporating longitudinal research design. Finally, it would be interesting if future research incorporates firm performance.

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