

## DIGITAL TECHNOLOGY ON THIRD-PARTY LOGISTICS SERVICE PROVIDERS IN SUPPLY CHAIN: TAMIL NADU

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### ABSTRACT

*The process of obtaining raw materials, material handling, and distribution products from spot of origin to spot of consumption with the help of transportation. A transportation network can be classified as a direct network or a hub-and-spoke network. Digital transportation is the fastest mode of transportation. Third-party logistics take care of the deliver sequence process. Nowadays, many companies are outsourcing their logistics functions to 3PL services providers. The major seek of the cram is the benefits & challenges of the transporters. The methodology used in this study was a simple random sampling technique. Simple random sampling was used in this study. The selected region was Chennai and Coimbatore.*

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**Keywords:** 3 PL, Technology, Supply Chain, Chennai, Thoothukudi.

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### Introduction

Logistics and supply chain are concerned with substantial and in sequence surge and storage from resources through to the final distribution of the defunct manufactured goods. Thus supply and materials management represents the storage and flows from the final production point through to the customers or end-user. Most important prominence is now located on the magnitude of in order as well as objective run and storage and an additional and very relevant factor is that of reverse logistics- the flow of used products and refundable paper back through the scheme (**Alan Rushton, Phil Croucher & Peter Baker, 2010**). To optimize the costs of logistics and shipping which focuses on the core activities, several foreign organizations and business outfits were outsourced some of their logistics activities to 3PL companies. This becomes a common practice in international business as a result of comprehensive knowledge and experiences which permit the provision of logistics and transportation at minimal costs. Strong competitive advantages in several industries are considered the key factor for the development and appearance of 3PL. The 3PL have several services as accomplish, these are cross-docking, transport, wrapping, warehousing, and freight forwarding (**Gudehus and Kotzab, 2012**)

**Cheng (2009)** revealed an observed revision of supply chain appearance in ship logistics. Although 3PL is commonly acknowledged as a light-asset business, there is an investment to assets flow that accomplish as fixed assets stock. The company outlines the Asset investment ratio to endure the required stock of technology and equipment. **Zhao, Ding, and Liu (2007)** are referring to research on performance evaluation of logistics service based on SCM which is related to the financial model.

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## Review of Literature

**Peter van Laarhoven, Magnus Berglund, and Melvyn Peters, (2000)** in their paper "Third-party logistics in Europe -five years later" the results of a review along with shippers in some European countries concerned in outsourcing their ship, warehousing, and other logistics deeds. The analysis has led to two major comments: primary, that the scope and level of superiority of the partnership have enlarged over the most recent five years, be it very gradual, and next, that the view of outsourcing by shippers has not transformed in excess of the previous five duration.

**Jay Sankaran (2000)** in his paper points out it is well recognized that inside an monetary region, shippers' practice of logistics is shaped appreciably by various factors, such as transportation regulation. He examine the assorted modes of household freight transport, the deregulation and privatization of the transportation sector.

**Zacharia, Z. G., Sanders, N. R., & Nix, N. W. (2011).** imaginary standpoint based on resource - base conjecture, network theory and deal cost financial side, and a thorough literature review, to develop a model with seven propositions. Finally, using planned interview of trade supervisory from a leading 3PL, practical support for the model and propositions that can be used to defined the orchestrator role of a 3PL.

**Dongmin Kye, Jeongeun Lee, and Kang- Dae Lee, (2013)** prove "the perceived impact of packaging logistics on the efficiency of freight transportation (EOT)" examine the interaction and relationship between packaging logistics and EOT.

**Ozden et al., (2013)** analyzed, "Selection of a third-party logistics service provider for an aerospace corporation: an logical resolution aiding approach", As shippers worldwide are increasing their use of third party logistics (3PL) services, the require for cautiously select 3PL service provider is flattering much more essential.

**Evangelista, P (2014)** 3PL are activities carried out by a logistics service supplier on behalf of a transporter and consist of at least haulage. In addition, other activities can be integrated into the service offering, such as warehousing and record supervision, information-related activities like track and tracing, and value-added supply chain behavior, including derived assembly and product installation. The section following this Introduction describes in detail the review methodology and the search strategy adopted.

**Jian-yu Fisher Ke et al (2015)** in their paper on note the purpose is to propose that transportation modal mix in global supply chains is a result of the strategic alignment between industry characteristics and supply chain strategies

**Hanif, R., & Kaluwa, E. (2016)** analyze the challenge opposite the transport logistics trade in sub-Saharan Africa specifically Malawi. Data was solicited from a structured questionnaire that was circulated to purposely selected members from the populace of the production group of people with knowledge in convey logistics.

**Hemalatha, D., & Balaji, S. (2020)** this study, the researcher tries to identify the key areas to be enhanced to improve the taken as a whole good organization of the cold chain logistics for pharmaceutical products like vaccines. The general objective of this study is to assess the problems faced by freight forwarders in cold chain contribute logistics on the safety of vaccines in pharmaceutical distributors. The other objectives are to decide storage space circumstances in pharmaceutical distributors authority the security of vaccines, evaluate the influence of paper in pharmaceutical distributors on the shelter of vaccines, and establish the extent to which technical capacity in pharmaceutical distributors influences the safety of Vaccines.

**Hofmann, E., & Osterwalder, F. (2017).** 3PLs focus on standard armed forces may lose significant market share shortly, management-related 3PL actions seem to be all the time more existing by new external competitors, which may downgrade 3PLs to simple forwarders. Third, digitalization enable the forward or backward combination of 3PL customers and suppliers when they establish their services. These include the customization of standardized logistics services, the provision of cloud logistics services, platform-based quality and logistics communications sharing, the "physical internet" as a future shipping system, and the adoption and amalgamation of 3D print into obtainable 3PL trade model

**(Zhao et al., 2019).** Two high-flying reimbursement of blockchain equipment are that it provides a everlasting operation record that is group into personage block and cannot be tampered with; and replaces those traditional paper tracking and manual monitoring systems which check the traditional way of doing production, characterized by inaccuracies.

**Marusin, A., Marusin, A., & Aplyazov, T. (2019)** digital model based on systems for automatic travel offense recording and the public-private party based mechanism is proposed as an economic tool for transport infrastructure digitization to provide for interaction between the entities of automatic traffic offense recording systems implementation and operation. In our opinion, the interaction of entities involved in the traffic safety process using the automatic traffic offense recording systems based on the public-private partnership mechanism opens the potential for the development of digital technologies in this subject domain and promotes the innovative development of transport transportation under conditions of the digital economy formation.

**S. Vasantha., S. Meena., (2019)** A well-structured questionnaire was prepared to draw out the data from the freight forwarders. The study is concluded by giving the ways to ways to overcome the challenges faced by the Freight Forwarders.

**Mathauer, M., & Hofmann, E. (2019).** The paper provides a structured literature review of the state-of-the-art in technology adoption by LSPs. Drawing on the modernization dissemination assumption and absorptive capacity, the explorative case study do research include systematic analysis of ten technology projects conducted by seven diverse LSPs

**Raja, R., & Venkatachalam, S. (2020).** In this study, technology accelerates knowledge sharing across supply chains and among supply chain partners. For instance, Machine learning, the Internet of things, artificial intelligence, Cloud computing, and as well as other enabling technologies bring the supply chain visibility, by sharing more immediate information about products and goods. Third-party logistics (3PL) is in advance significance as more and supplementary organizations across the earth are outsourcing logistics activities to the 3PL service providers.

**M Senthil, R Ruthramathi, N Gayathri (2020)** The goal of the study is to be aware of the use of the latest technologies by warehouse service providers and major challenges and benefits faced by the warehouse operators, in using various technologies like GPS, Barcode, RFID, Drones, IoT, AI, Cloud computing, Robotics, and Blockchain technologies by 3PL service providers dealing with V.O.C port, Tuticorin distrct. The necessitate to deliberate the interdependencies of multiple technologies arises to strategize a comprehensive approach in executing the exponential technologies.

**Sivakumar, V., Ruthramathi, R., & Leelapriyadharsini, S. (2020)** inspect the technology reimbursement and confront face by the practitioners as well as the relevant parties concerned within the logistics and supply chain industries. Thus, provided a base for future researchers to examine any aspects of logistics and supply chain management in Tuticorin.

**Humayun, M., Jhanjhi, N. Z., Hamid, B., & Ahmed, G. (2020)** the field of logistics and shipping by exploring the potential of IoT and Blockchain technology in smart logistics and transportation. BCTLF for smart logistics and transportation that integrates IoT and Blockchain to provide an intelligent logistics and transportation system. Finally, we present two real-life IoT and Blockchain-based case studies to highlight the contribution of IoT and Blockchain in logistics and transportation.

**Premkumar, P., Gopinath, S., & Mateen, A. (2021)** future research should focus on driving innovation, particularly within the last mile by utilizing route optimization, incentivized scheduling, and real-time electronic tracking and communication. It should also focus on how to leverage employees and provide added value to shippers. Supply chain transformation through improved logistics optimization and improved integration across the supply chain is also another important avenue to pursue in the future.

### Research Objectives

- To understand the 3PL in the logistics and transportation sector.
- To explore the benefits of the transporters by using Digital technologies.
- To classify the major challenges faced by the transporters in Tamil Nadu.
- Offer feasible suggestions to prevail over the challenges of transporters.

### Methodology

A quantitative survey was proposed in December 2021 consisting of 13 questions. First demographic profile of service providers; second usage of technology by service providers, third Challenges faced by transporters while using the technology, and finally Benefits of using digital technology. The survey was dealt with using the online survey and offline survey. the population from Chennai was 281 and the Coimbatore region was 376. A total of the total population is 657, the sample size is 243 potential participants accessed the online survey was taken, through the software "Raosoft".

## Findings and Discussion

**Table 1: Demographic Profile of the Target Audience**

S.No	Variable	Classification of the Variables	Frequency	Percentage
1.	Gender	Male	96	39.5
		Female	147	60.5
2.	Age	19-29	44	18.1
		30-39	77	31.7
		40-49	39	16.0
		50-60	44	18.1
		Above 60	39	16.0
3.	Designation	Supply chain logistics Manager	45	18.5
		Transportation Manager	89	36.6
		Logistics Manager	109	44.9
4.	Year of Experience	<= 5 Yrs	12	4.9
		6-10 Yrs	71	29.2
		11-15 Yrs	83	34.2
		16-20 Yrs	15	6.2
		Above 20 Yrs	62	25.5
5.	Education Qualification	Diploma	13	5.3
		Graduate	133	54.7
		PostGraduate	51	21.0
		Others	46	18.9
6.	Employees are Working	Below 10 Employees	64	26.3
		11-25 Employees	85	35.0
		26-50 Employees	33	13.6
		51-100 Employees	9	3.7
		Above 100 Employees	52	21.4
7.	Marital Status	Single	56	23.0
		Married	187	77.0
8.	Monthly salary	Less than 10,000	70	28.8
		10,001 - 25,000	104	42.8
		25,000 - 50,000	61	25.1
		More than 1,00,000	8	3.3
9.	Location	Chennai	114	46.9
		Thoothukudi	129	53.1

Source: Primary data

The sample consisted of more males (96 frequency) than female participants (147 frequency) as the number of male respondents is less than female respondents. The age of the respondents ranged from 30 to 39 is high. The designation of the respondents is Logistics Manager is 44.9 Percent. Graduated working persons are high in the transportation companies. The results are presented in Table 1.

### Hypothesis

**H<sub>0</sub>:** There is no significant difference between the education qualification and the Transportation Services & Capabilities

**Table 2: Difference between the Transportation Services & Capabilities and the Education Qualification of the Respondents**

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Small Package	Between Groups	49.046	3	16.349	9.595	.000
	Within Groups	407.234	239	1.704		
	Total	456.280	242			
Air Cargo	Between Groups	4.262	3	1.421	.835	.476
	Within Groups	406.478	239	1.701		
	Total	410.741	242			

Intermodal	Between Groups	24.921	3	8.307	4.379	<b>.005</b>
	Within Groups	453.375	239	1.897		
	Total	478.296	242			
Ocean	Between Groups	32.213	3	10.738	7.246	<b>.000</b>
	Within Groups	354.166	239	1.482		
	Total	386.379	242			
Rail	Between Groups	10.364	3	3.455	2.188	.090
	Within Groups	377.274	239	1.579		
	Total	387.638	242			
Bulk	Between Groups	6.674	3	2.225	1.411	.240
	Within Groups	376.865	239	1.577		
	Total	383.539	242			
Dedicated Contract Carriage	Between Groups	79.141	3	26.380	11.205	<b>.000</b>
	Within Groups	562.711	239	2.354		
	Total	641.852	242			
Fleet Acquisition	Between Groups	8.847	3	2.949	1.334	.264
	Within Groups	528.174	239	2.210		
	Total	537.021	242			
Equipment/Drivers	Between Groups	10.380	3	3.460	1.878	.134
	Within Groups	440.320	239	1.842		
	Total	450.700	242			
Final Mile/White Glove	Between Groups	13.642	3	4.547	2.419	.067
	Within Groups	449.321	239	1.880		
	Total	462.963	242			

\*Significant at 0.05% level

### Interpretation

From the above table it is interpreted that among all the factors relating to that of challenges of transporters, only four factors that agree with the respondents in Air Cargo, Rail, Bulk, Fleet Acquisition, Equipment/Drivers, Final Mile/White Glove these factors of transporters which has the significant value greater than the P-value, Those factors are influencing factors while comparing with the other four factors and considered as strategically important challenges for all the transporters and industries.

### Hypothesis

$H_0$ : There is no significant difference between the area of residence and digital technology users

**Table 2: Difference between the area of residence and digital technology users**

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
GPS	Between Groups	46.307	1	46.307	42.867	<b>.000</b>
	Within Groups	260.343	241	1.080		
	Total	306.650	242			
Barcodes	Between Groups	.154	1	.154	.089	.765
	Within Groups	414.422	241	1.720		
	Total	414.576	242			
RFID	Between Groups	.583	1	.583	.671	.414
	Within Groups	209.401	241	.869		
	Total	209.984	242			
Drones	Between Groups	12.412	1	12.412	24.017	<b>.000</b>
	Within Groups	124.551	241	.517		
	Total	136.963	242			
Internet of Things	Between Groups	20.457	1	20.457	35.882	<b>.000</b>
	Within Groups	137.395	241	.570		
	Total	157.852	242			
Artificial Intelligence	Between Groups	18.839	1	18.839	14.972	<b>.000</b>
	Within Groups	303.243	241	1.258		

	Total	322.082	242			
Cloud Computing	Between Groups	.810	1	.810	.980	.323
	Within Groups	199.190	241	.827		
	Total	200.000	242			
Robotics	Between Groups	5.273	1	5.273	3.928	.049
	Within Groups	323.500	241	1.342		
	Total	328.774	242			
Block Chain	Between Groups	7.863	1	7.863	4.668	.032
	Within Groups	405.988	241	1.685		
	Total	413.852	242			

\*Significant at 0.05% level

**Interpretation**

From the above table, it is interpreted that among all the factors relating to that digital technology used in companies and industries in Tamilnadu. Total ten digital technological factors like GPS, Barcodes, RFID, Drones, Internet of things, Artificial Intelligence, Machine learning, Cloud Computing, Robotics, Blockchain. Barcodes, RFID, Cloud Computing are those three technologies that are greater than the significance value. Those technological factors are while compared with the other locations and considered as strategically important of the transporters.

**Fig. 1: Benefits of Transportation by using Technology**

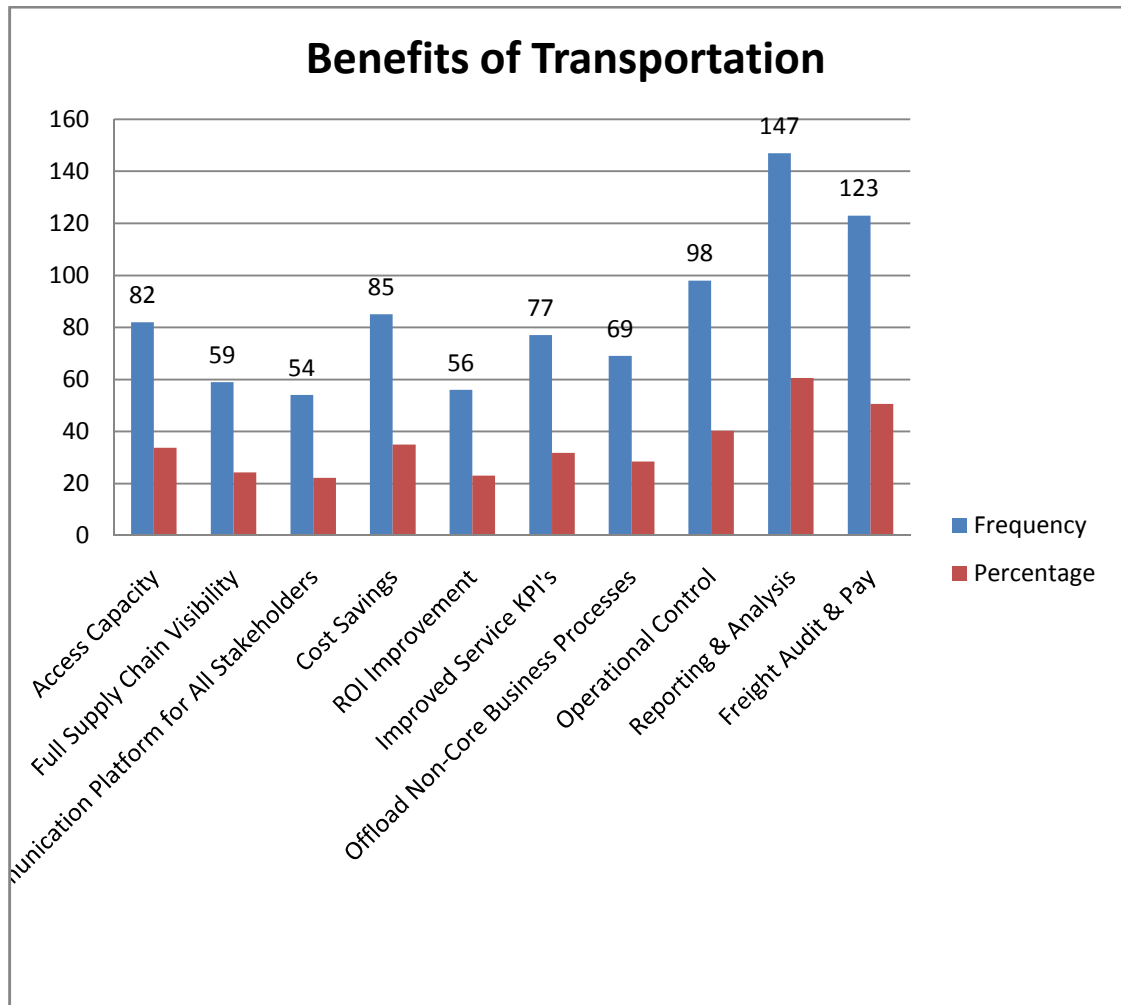


Fig.1 represents the benefits of transportation by using digital technology, the most benefits for the transporters are Reporting and Analysis, Freight Audit & Pay. Other factors are benefits to the transports to improve the feature of factors in the transportation.

CT 1 Bulk Order Intensity Ratio

CT 2 Hike In Fuel Cost

CT 3 Unforeseen Delays in Transportation

CT 4 Dearth of Skilled Personnel

CT 5 Pitiabile Warehousing Conditions

CT 6 Inadequate and Overstressed Delivery Staff

CT 7 High infrastructure maintenance costs

CT 8 Accidents and safety

**Table 3: Correlation between the Challenges of Transportation and Transporters**

		Correlations							
		CT1	CT2	CT3	CT4	CT5	CT6	CT7	CT8
CT 1	Pearson Correlation	1							
	Sig. (2-tailed)								
	N	243							
CT 2	Pearson Correlation	-.109	1						
	Sig. (2-tailed)	.089							
	N	243	243						
CT 3	Pearson Correlation	.099	-.066	1					
	Sig. (2-tailed)	.124	.304						
	N	243	243	243					
CT 4	Pearson Correlation	.043	.422**	.094	1				
	Sig. (2-tailed)	.508	.000	.144					
	N	243	243	243	243				
CT 5	Pearson Correlation	-.249**	.250**	.310**	.386**	1			
	Sig. (2-tailed)	.000	.000	.000	.000				
	N	243	243	243	243	243	243		
CT 6	Pearson Correlation	-.005	-.160	.004	-.065	-.187*	1		
	Sig. (2-tailed)	.938	.013	.947	.316	.003			
	N	243	243	243	243	243	243	243	
CT 7	Pearson Correlation	-.179*	.324*	.164	.377*	.607*	-.051	1	
	Sig. (2-tailed)	.005	.000	.010	.000	.000	.429		
	N	243	243	243	243	243	243	243	243
CT 8	Pearson Correlation	-.236**	.104	.087	-.008	.321**	.047	.256**	1
	Sig. (2-tailed)	.000	.106	.174	.898	.000	.464	.000	
	N	243	243	243	243	243	243	243	243

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

### Interpretation

In table 3, CT2, CT3 represents the Hike In Fuel Cost, Unforeseen Delays in Transportation, in the challenges of the transports in the third-party logistics service providers in Tamil Nadu. To overcome the challenges faced by the transports in TN. All other factors determine the p-value of the significance level is less than 0.05. Therefore the other factors are rejected the null hypothesis and others are accept the hypothesis.

### Suggestions

Digital technology is to go on become increasingly connected, and various technologies like IoT, Cloud Computing, AI, RFID, GPS, etc, The digital revolution is helping organizations transform their businesses to better engage and stay connected with customers, suppliers, and employees. The internet and services related to it create an interactive working environment for users. Modern supply chain firms are adopting digital logistics to improve distribution methods including the WMS. They also recognize the opportunity to automate the transportation process and shipper operations in the sector.

## Conclusion

This study concluded that digital technology on 3 PL in Tamilnadu. Those technologies are very most important to the 3 L providers in TN. Digital technology reduce labor cost by streamlining data imprison and dropping error- Prone manual Processes. Moreover, this paper used the ten digital technology adoption strategies and proposed a conceptual framework and empirical framework in logistics and supply chains industries. Technology now plays a key role at every stage of the supply chain process. Finally, connectivity is all concerning expediency, and reformation workflow to assist any trade become more stretchy, well-organized, dynamic, and thriving.

## Acknowledgment

Ms. R. Ruthramathi is a recipient of the Indian Council of Social Science Research Doctoral Fellowship. His/her article is largely an outcome of his/her doctoral work sponsored by ICSSR. However, the responsibility for the facts stated, opinions expressed and the conclusions drawn is entirely that of the author.

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