Technological Innovation and Performance of Third Party Logistic Firms in Tanzania

*Maureen Semu Kabugumila
ORCiD: https://orcid.org/0000-0002-4300-5317
Faculty of Logistics and Business studies, National Institute of Transport, Tanzania
Email: reenkabugu@gmail.com

Alberto Gabriel Ndekwa, PhD
ORCiD: https://orcid.org/0000-0001-7177-583X
Faculty of Business and Management Sciences, Ruaha Catholic University, Tanzania
Email: albandekwa@gmail.com

*Corresponding Author: reenkabugu@gmail.com

Abstract
The study aimed at investigating the role of technological innovations on the performance of third party logistic firms in Tanzania. The study employed explanatory research design, which was cross sectional in nature. The study sampled 320 respondents from 850 third party logistic firms, who participated through a questionnaire. Data analysis involved the SEM SMART PLS 4 statistical tool. Based on the findings, the study concludes that technological innovation yields substantial impact on the performance of logistic organizations. Therefore, the study recommends that third party logistic organizations need to increase the use of technological innovations to enhance their performance.

Keywords: Modernization theory; technological innovation; performance.

Introduction
Rapid changes in technology has drastically changed competitive industrial dynamics, including logistics services (Cichosz et al., 2020 ; Mahroof, 2019; Winkelhaus & Grosse, 2019). In order to perform competitively and attain customers' value proposition , technology has become a fundamental strategy to logistics industry (Souto, 2015; Laosirihongthong et al., 2014; Lagorio et al., 2020). Competition and drastic changes in markets compel logistic firms to be in a better position to address the markets changes and become agile, proactive and responsive to meet different market challenges, such as transparency, cost effectiveness, increased customer exposure, competition with new entrants in the market and continuous change of technology.

Technological innovation in logistics involves improved mechanisms, tools, systems, software and equipment as well as physical activities that are adopted by the firm in production of services and observable outcomes as well as effective delivery systems, within and beyond organizational boundaries (OECD/Eurostat, 2005;OECD/Eurostat, 2018; Lagorio et al., 2020). Thus, technological innovation has to influence performance of logistic firms. Performance of logistic firms is determined using multiple dimensions, which are objective and subjective, such as the turnover, the reputation, the cost of operation and profitability. The need of logistics firms to perform and sustain continuous business environment dynamics demands firms to adapt and advance different digital technologies in their operations. Technologies such as Artificial intelligence and other real time technologies have

to be embedded in logistics activities so as to provide more efficient and effective services and align with customers' expectations (Mahroof, 2019).

In Tanzania, logistic industry has a significant contribution on the economy. It contributes 8.1% of the country's GDP, with the increase of cargo and passenger (Tanzania Invest, 2020). Party, Logistic firms are among the players in the logistic industry. Third party logistic firms are those that provide and support logistic services on behalf of the customers. They have to perform various activities, ranging from warehousing, custom services, data processing, transportation, inventory management and communication. These members need to be technologically equipped by being abreast with technological innovation changes, accommodating technological changes in their logistics activities.

The significant role of logistic sector has driven different initiatives so as to blend logistic activities with technological changes in Tanzania. For instance, the World Bank in Tanzania has been very supportive in improving the logistic sector, through facilitating reforms on management and technological solutions, such as investment in logistics and transport services, customs and border management, infrastructure development and regional and corridor facilitations, capacity building, technological development and innovation (IBRD/The World Bank, 2018. Likewise, the Government of Tanzania has put in place different initiatives that address the logistic industry so as to make the industry more vibrant.

These initiatives include the National Transport Policy Action Plan of 2011/2012 to 2015/2016 and the five year development plans (FYP) III 2021/2022 to 2025/2026. The initiatives focus on the National Transport Policy Action Plan with goals aiming at improving freight logistics by 2023, the rehabilitation of port and railway systems and their operations, capacity building in logistics through different training institutes, such as the National Institute of Transport, Dar es Salaam Maritime Institute, Bandari College and others (URT, 2003; African Development Bank, 2013).

Despite different initiatives, studies show that logistic companies in Africa are still lagging behind in performance (REPOA, 2022). Reports show that most of the African countries feature the last ten-bottom position in the Logistics Performance Index. The reports by IBRD/The World Bank (2018) show that the logistics and transportation industry in developing countries have not performed well as expected. Despite Tanzania's improvements in logistics services, the country having the average of 2.81 point out of 5 point(IBRD/The World Bank, 2018), is still facing some challenges that hinder the performance of the logistic industry. Challenges are such as inadequate handling and storage facilities, inefficient and unreliable services, which result into the country having high logistic costs. Issues such as, unsatisfactory services, poor flexibility to respond to changing environment and prompt service response still persist (Jaafar et al., 2008). In response, this study sought to establish the extent of technological innovations performance in logistics industry through third party logistics firms and also the role that technological innovation plays to improve performance of third party logistic firm in Tanzania.

Literature Review
This study has been grounded by two kind of literature review. The initial review is based on the theoretical foundation that guided the study. Later, the review involved empirical studies on the avenues of logistics and those that are related to the constructs and variables used in the study.

Theoretical Underpinnings
Talcott Parsons, who believed that changes lead to economy transformation, founded modernization theory that underpins this study. Modernization theory describes technological innovation and cultural change as important attributes (Irrgang, 2007). According to the modernization theory, the uptake on technological innovation facilitates industrial transformation (Kleiner, 2020). Modernization theory is seen in practice with reflection to adaptation of new technologies in the development of economic industries. Technologies, such as data technology development, are a reflection of the modernization theory. The reason behind using the modernization theory is to strengthen the theory and enhance its applicability in the logistics industry by determining how different technological innovations have influenced the performance of logistic service providers.

Technological Innovation and Performance
Third party logistic firms are companies that provide single and multiple logistic services to a purchasing company. A third party logistic service provider does not own the products. They are bound to perform logistic services. Logistic enterprises, such as third-party logistics firms, with technological innovation and current technologies are projected to achieve

greater business performance in terms of quality and quantity, resulting in a stronger competitive advantage and financial benefit (Oláh et al., 2018; Acar, 2021).

Studies have indicated that logistic companies that have positive attitude towards adopting and use of technology have both financial and non-financial performance (Lin & Ho, 2007). In the same vein scholarly studies that have affirmed this argument are for instance, Mathauer and Hofmann (2019),who found that adoption and access of different innovated technological facilities or systems pre determine the success of the logistic process, whereas the success of process integration of Logistics Service Providers depends on different technological modes adopted by the company. Ciprés et al. (2016) affirmed that best practices of logistics attribute the technological innovation in areas, such as electronic freight and integrated distribution management process. The best practices are such as storage, picking of products, truck docking and proper assignment of different tasks with other organizational system, to facilitate the management of commodities. In addition, Mahroof (2019) advocated on the significance of automating warehousing systems to reduce cost, save time and enable the efficient utilization of allocated space in order to attain competitiveness.

Methodology
Design
This study adopted the positivism research philosophy, so as to explain prediction and casual-effect relationship of constructs using scientific methods. Therefore quantitative research approach was used, so as to analyze numerical data which were collected through cross sectional research survey from third party logistic firms, so as to test hypotheses that were constructed based on theoretical and empirical literature (Park et al., 2020; Saunders et al., 2019). The study employed the explanatory design to determine the causal effect relationships between technological innovation and performance of third party logistics firms.

Population and Sampling
In this study, the unit analysis was directors, managers or logistic officers from 850 third party logistic firms. Using the Yamane formula, the sample size was expected to be about 287 logistic firm representatives, but during the data collection phase, 350 questionnaire sheets were sent to one representative (directors, managers or logistic officers) from 350 third part logistic firms. Of those, only 320 filled and returned the questionnaire.

Instrument
This study employed a questionnaire as the instrument of data collection. The questionnaire was an effective tool for collecting the survey data from a large sample. The questionnaire contained indicators for technological innovation and performance of third party logistic firms.

Validity and Reliability
The study assessed the convergent validity using the Average Variance Extract (AVE). This measure refers to the extent to which items on a specific construct correlate positively and share a high degree of variance as assessed through the AVE. The rule of thumb is that the values of .50 or higher provide evidence of the convergent. The discriminant validity was tested through Hetero-Monotrait Ratio (HTMT), which reflects the extent to which a construct better explains the variance in its own indicators, compared to the variance of other constructs. Furthermore, internal consistency reliability was ensured using the composite reliability test. The yielded score of .70 for both measures appear to be acceptable (Hair & Alamer, 2022) .

Statistical Treatment of Data
The study used the SEM SMART PLS 4 statistical tool in both descriptive and inferential analysis. The interpretation of the mean scores was as follows: 5 to 4.1 = high extent, 3.01 to 4 i= medium-high extent, 2.01 to 3 = medium- low extent and 1 to 2 = low extent. The analysis of the hypothesis involved the SEM SMART PLS bootstrapping.

Ethical Considerations
Participation was voluntarily and each respondent was free to withdraw at any time. Furthermore, the researchers ensured the respondents of anonymity and confidentiality of the data collected.

Results and Discussions
This part presents the findings of the study and discusses the findings.

Demographic Analysis
This study received 320 questionnaire sheets, collected from selected directors, managers or logistic officers. The demographic analysis appears in Table 1. The experience appears in three ranges: 0 to 5 years with 113 respondents (35.3%), 6 to 10

years with 104 respondents (32.5%) and above 10 years with 103 respondents (32.2%).

In terms of educational level, the majority of the respondents occupied college/ university education with 91.3%. The remaining minority occupied primary or secondary education.

Measurement Model Analysis
Before proceeding with further analysis, the reflective measurement determined the quality of data.

In terms of educational level, the majority of the respondents occupied college/ university education with 91.3%. The remaining minority occupied primary or secondary education.

Table 1: Demographic Characteristic of the Respondents

Characteristics	Category	No of Respondents (n=320)	Percentage
Experience	0-5	113	35.3
	6-10 years	104	32.5
	Above 10 years	103	32.2
Education level	Primary	3	0.9
	Ordinary level	7	2.1
	Advanced level	9	2.8
	College/University	292	91.4
	Missing Figure	9	2.8

Measurement Model Analysis
Before proceeding with further analysis, the reflective measurement determined the quality of data.

Indicators loadings
Firstly, the study assessed the indicator loadings to explain the contribution of each indicator to the construct. The score between 0.6 and 0.7 is acceptable if the validity and reliability of the constructs are within the threshold. The indicator above 0.6 implies the indicator is explained by the construct for more than 60 percent (Hair et al., 2018; Benitez et al., 2019). Most of the indicators in this study ranged from 0.6 to 0.7 as it appears in Table 2, which is the acceptable range.

Table 2 Indicators loadings

Indicators	LogPerf	TechInnv
LP1	0.713	
LP2	0.775	
LP3	0.812	
LP4	0.675	
LP5	0.767	
T2		0.614
T4		0.778
T5		0.799
T6		0.651

LP1= On time delivery; LP2=Reduced our operation cost; LP3= acquire valued customer; LP4=Retain customers; LP5=Increased sales turnover; TI2= Effective warehousing system; T4=Effective documentation technologies and systems; T5=Effective in transit management systems; T6=Effective database management system.

Validity and Reliability
The study assessed the internal consistency using the composite reliability. The results indicate that data had internal consistency. From the reliability results, the composite reliability for the performance of third party logistics firms was 0.865 while for technological innovation it was 0.805. Convergent validity was tested using the Average Variance Extracts (AVE), which revealed that both constructs had attained the AVE value above the threshold of 0.5. The convergent validity for Technological innovation was AVE=0.511 while for the performance of third party logistics firms was AVE=0.563. Discriminant validity was tested using the heterotrait - monotrait (HTMT) ratio and the cross loading ratio. The HTMT ratio between technological innovation and the performance of the third party logistic firm was 0.493, which is within the threshold of above 0.3 (Hair et al., 2018).

Cross Loading
Discriminant validity can also be determined using cross loading assessment. In the cross loading assessment, specifically, an indicator's outer loading on the associated construct should be greater than any of its cross-loadings (i.e., its correlation) on other constructs. Furthermore, cross loading

determined the discriminant validity among constructs, as indicated in the Table 3.

Table 3: Cross loading

	LogPerf	TechInnv
LP1	0.713	0.218
LP2	0.775	0.318
LP3	0.812	0.341
LP4	0.675	0.208
LP5	0.767	0.317
TI2	0.186	0.614
TI4	0.324	0.778
TI5	0.3	0.799
TI6	0.262	0.651

Structural Model Analysis

After assessing the measurement model, the assessment of the structural modal determines the model's predictive power. In the structural model assessment, R^2 showed a lower explanatory power of the technological innovation to the logistic firms' performance by having the $R^2 = 0.148$, as indicated in table 4. Previous literature justifies that the higher the number of predictors, the greater the R^2 (Hair et al., 2018). Furthermore, the study assessed the f^2 effect to establish the effect technological innovation has on the logistic performance. The results in Table 5 show the $f^2 = 0.173$, implying that technological innovation has above medium effect in producing the R^2.

Table 4: R Square

Endogenous Constructs	R Square	R Square Adjusted
LogPerf	0.148	0.145

Guidelines for assessing the $f2$ are that values of 0.02, 0.15, and 0.35, respectively, represent small, medium, and large effects (Hair et al., 2018) .

Table 5 f^2 Effect Size

Constructs	LogPerf	TechInnv
TechInnv	0.173	

Table 6: Model Fit

	Estimated model
SRMR	0.081
Chi-square	159.410
NFI	0.791

Later, the assessment ascertained the model fit, using various criteria. The first criteria was the standardized root mean square residual (SRMR), which had the acceptable value of 0.081 as seen in Table 6, where the acceptable score should not exceed 0.08 (Hair et al., 2018) ,then the Chi-square value was determined, which was also in an acceptable range since it had the value higher than 1 as seen in Table 6. Finally, the Normed Fit Index (NFI) value was assessed, scoring 0.791, which is

accepted as a good fit criteria, since it is less than 0.9 fit (Hair et al., 2018).

Research Question 1: What is the extent of technological innovations performance in the third party logistics firms?

The analysis starts by establishing the overall mean score of technological innovation indicators. Then the overall mean score of the construct was calculated.

In order to determine the extent of technological innovation performance in the third party logistic firms, decision criteria was set based on the mean score values (MSV) of (Hassan et al., 2018) that the Mean score value between 4.1 and 5 indicates high extent, between 3.01 and 4 indicates medium-high extent, between 2.01 and 3 indicates medium- low extent and between 1 and 2 indicates low extent. The descriptive statistics appear in table 7 and table 8.

Table 7: Descriptive Analysis for Technological Innovation

Technological Innovation	MSV
TI2- warehousing system	3.63
TI4- documentation technologies and systems	3.10
TI5- transit management systems	3.31
TI6 -database management system	2.56
Overall MSV	3.15

The analysis in Table 7 involved four indicators of technological innovation, which are warehousing system, documentation technologies and systems, transit management systems and database management system. The overall results for technological innovation in Table 7 show medium high mean score (3.15).

Warehousing Technologies

In the case of warehousing and storing technologies, the result showed MSV=3.63 as shown in table 7, indicating high moderate performance of warehousing technologies in third party logistic firms. The findings depict availability of sophisticated and innovative technologies in warehouses and storage depots such as inland container depots (ICDs), which enhances performance of 3PL firms. Therefore, more investment in warehousing technologies is needed, given the vast continuing expansion of logistics activities in the country.

Documentation Technologies

The documentation technologies factor yields MSV=3.10 as shown in table 7, indicating high moderate performance. This implies 3PLs increase the operational efficiency; however there is a need for more efforts to attain the highest extent, since documentation and information exchange in logistics is very important (Yang & Chang, 2019).The role of electronic documentation can be seen on various occasion.

Transit Technologies

Transit technologies, such as track and tracing technologies, yielded the MSV= 3.31 as shown in

table 7, indicating medium high performance of transit technologies. As some studies show, customers wish to track their consignment and know the where about of them (Ejem et al., 2021). Kiliru (2017) found that among technologies in logistics and transportation industry, tracking technologies, such as GPS, was the commonly used in Kenya for fleet management to facilitate adequate time delivery. Despite having high-moderate performance, results indicate much effort has to be done. This implies that third party logistic firms have not used the transit technologies to the maximum to support their business performance. Transit innovative technologies can increase efficiency of business operations by minimizing delays and giving proper location information, which increases efficiency and prevents unnecessary costs (Wang et al., 2020; Walasek et al., 2021).

Database Management Technologies

On the other hand, database management technologies yielded MSV= 2.56 as shown in table 7, which indicate database management technologies have low medium performance. The results shows that there is a lot more to be done in this particular context, since effective database management increases efficiency (Walasek et al., 2021)

The analysis in Table 8 involved on time delivery, lowered operation cost, customer acquisition, customer retention and increased sales turnover respectively. The overall mean score value for performance of third party logistics firms from table 8 is 3.59 (high medium).

Table 8: Third party Logistic Service Performance

LogPerf	MSV
LP1 on time delivery	3.50
LP2 lowered operation cost	3.5
LP3 customer acquisition	3.67
LP4 customer retention	3.83
LP5 increased sales turnover	3.46
Overall MSV	3.592

Table 7: Hypothesis Testing Results

Paths	Coefficients	T-value	P Values	Decision
TechInnv -> LogPerf	0.395	8.576	0.000	Supported

Research Question 2: Is there a significant effect of technological innovation on performance of third party logistics firms?

Research question 2 called to testing of the following null hypothesis: there is no significant effect of technological innovation on the

performance of third party logistics firms using the SMART PLS 4 bootstrapping technique.

The results from bootstrapping as indicated in table 7 reveal the path co-efficient of 0.395, which implies there is a positive relationship between technological innovation and performance. Since the p-value is <0.05, the null hypothesis is rejected, implying that technological innovation affects the performance of third party logistics firms in a positive way.

Scholars such as Chinelo (2021) produced similar results that the adoption and utilization of technology leads to high profits. And that logistic firms can become more competitive by implementing technologies. In addition, Ghadge et al. (2020) and Tucci et al. (2015) affirmed that transit technologies like tracking and tracing systems in logistics enable logistic organizations to have visibility and real-time access, which improves various logistics operations. Furthermore, Tseng (2013) emphasized that technologies that enable documentation and information exchange processes contribute to increased efficiency and promptness.

Conclusions and Recommendations

The study concludes that technological innovation yields substantial impact on the performance of logistic organizations. This is evidenced by the positive and considerable impact that technological innovations had on the performance of the third-party logistic organizations under investigation. Based on the conclusions, the study recommends that third party logistic organizations need to increase the use of technological innovations to enhance their performance.

Reference

Acar, A. Z. (2021). The mediating role of value innovation between market orientation and business performance : evidence from the logistics industry The mediating role of value innovation between market orientation and business performance : evidence from the logistics indu. International Journal of Business Innovation and Research, 21(4), 540–563. https://doi.org/1 0.150 4/IJBIR.2020.106012.

African Development Bank. (2013). Tanzania Transport Sector Review. *Tanzania Transport Sector Review*, 146.

Benitez, J., Henseler, J., Castillo, A. and Schuberth, F. (2019). How to perform and report animpactful analysis using partial least squares:Guidelines for confirmatory and explanatory IS research. Information and Management, 57(2), 1–56. https://doi.org/10.1016/j.im.2019.05.003.

Chen, J. S., Tsou, H. T. and Huang, A. Y. H. (2009). Service delivery innovation: Antecedents and impact on firm performance. Journal of Service Research, 12(1), 36–55.

Chinelo, U. U. (2021). Digitalization and Organizational Performance of Logistics Firms in Ifako-Ijaye Local Government of Lagos State. Cross Current International Journal of Economics, Managment and Media Studies, 2462(6), 62–70. https://doi.org/10.36344/ccijemms.2021.v03i06.00 1.

Cichosz, M., Wallenburg, C. M. and Knemeyer, A. M. (2020). Digital transformation at logistics service providers : barriers , success factors and leading practices. The International Journal of Logistics Management, 31(2), 209–238. https://doi.org/10.1108/IJLM-08-2019-0229.

Ciprés, D., Polo, L. and Capella, A. (2016). Innovation in Transport Logistics—Best Practices from the EU Project LOGINN. Lecture Notes in Logistics, 599–608. https://doi.org/10.1007/978-3-319-23512-7_58.

Ejem, E. ., Uka, C. ., Dike, D. ., Ikeogu, C. ., Igboanusi, C. and Chukwu, O. . (2021). Evaluation and Selection of Nigerian Third-Party Logistics Service Providers Evaluation and Selection of Nigerian Third-Party Logistics Service Providers Using Multi-Criteria Decision Models. Scientific Journal OnTransport and Logisitics, 12(1), 134–146.

Fatorachian, H. and Kazemi, H. (2020). Impact of Industry 4 . 0 on supply chain performance. Production Planning & Control:The Management of Operations, 32(1), 63–81. https://doi.org/10.1080/09537287.2020.1712487

Ghadge, A., Moradlou, H., Kara, M. and Goswami, M. (2020). The impact of Industry 4 . 0 implem entation on supply chains. Journal of Manufacturing Technology Management, 31(4), 669–686. https://doi.org/10.1108/JMTM-10-2019-0368.

Hair, J. and Alamer, A. (2022). Partial Least Squares Structural Equation Modeling (PLS-SEM) in second language and education research : Guidelines using an applied example. Research Methods in Applied

Linguistics, 1(August 2022), 4–19. https://doi.org/10.1016/j.rmal.2022.100027.

Hair, J. F., Risher, J. J., Sarstedt, M. and Ringle, C. M. (2018). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203.

Hassan, R., Ahmad, J. and Boon, Y. (2018). Instructional Leadership Practice Among Headmasters in the Southern Region of Malaysia. 90(2), 76–90. https://doi.org /https:// doi.org/10.32861/jssr.spi2.76.90.

IBRD/The World Bank. (2017). Tanzania DITS Update 2017/Boosting growth and Prosperity through agri business,extractives and tourism.

IBRD/The World Bank. (2018). Trade Logisitics in the Global Economy. Connecting to Compete -Logistic Performance Index.

Irrgang, B. (2007). Technology transfer and modernization. Ubiquity, 2007(December), 1–1. https://doi.org/10.1145/1345073.1331965.

Jaafar, H. S., Ali, R. M. and Mohamad, S. (2008). Logistics and Supply Chain in Malaysia : Issues and Challenges. EASTS International Symposium on Sustainable Transportation Incorporating Malaysian Universities Transport Reasearch Forum Conference 2008.., pp(1-11).Universiti Teknologi Malaysia.

Kiliru, A. V. (2017). Transport Management Technologies and Performance of Third Party Logisitics Providers in Kenya. In Dissertation. University of Nairobi.

Kirono, I. (2019). Logistics performance collaboration strategy and information sharing with logistics capability as mediator variable (study in Gafeksi East Java Indonesia). International Journal of Quality & Reliability Management, 36(8), 1301–1317. https://doi.org/10.1108/IJQRM-11-2017-0246.

Kleiner, G. B. (2020). Systemic Modernization of Russian Enterprises : Theoretical Rationale , Motives , Principles. 2015.

Lagorio, A., Zenezini, G., Mangano, G., Pinto, R., Lagorio, A., Zenezini, G., Mangano, G., Lagorio, A. and Zenezini, G. (2020). A systematic literature review of innovative technologies adopted in logistics management in logistics management. International Journal of Logistics: Research and Applications, 25(7), 1043–1066. https://doi.org/10.1080/13675567.2020.1850661.

Laosirihongthong, T., Prajogo, D. I. and Adebanjo, D. (2014). The relationships between firms strategy, resources and innovation performance: Resources-based view perspective. Production Planning & Control: The Management of Operations, 25(15), 1231–1246. https://doi.org/10.1080/0953728 7.2013.819593.

Lin, C.-Y. and Ho, Y.-H. (2007). Technological Innovation for China's Logistics Industry. Journal of Technology Management & Innovation, 2(4), 1–19.

Mahroof, K. (2019). International Journal of Information Management A human-centric perspective exploring the readiness towards smart warehousing : The case of a large retail distribution warehouse. International Journal of Information Management, 45(2018), 176–190. https://doi.org/10.1016/j.ijinfomgt.2018.11.008.

Mathauer, M. and Hofmann, E. (2019). Technology adoption by logistics service providers. International Journal of Physical Distribution and Logistics Management, 49(4), 416–434.

OECD/Eurostat. (2005). Oslo Manual 2005: Guidelines for Collecting, Reporting and Using Data on Innovation. In The Measurement of Scientific; Technological and Innovation Activities: Vol. Third edit. http://scholar.google.com/scholar?hl=en& btnG=Search&q=intitle:Oslo+manual#0.

OECD/Eurostat. (2018). Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation. In The Measurement of Scientific; Technological and Innovation Activities. https://doi.org/10.1787/9789264304604-en%0Ah ttps://www.oecd-ilibrary.org/science-and-technolo gy/oslo-manual-2018_9789264304604-en%0Ah ttps://www.oecd-ilibrary.org/science-and-technology/os lo-manual-2018_9789264304604-en%0Ahttps://www.oecd-ilibrary.org/scie.

Oláh, J., Karmazin, G., Pető, K. and Popp, J. (2018). Information technology developments of logistics service providers in Hungary. International Journal of Logistics Research and Applications, 21(3), 332–344.

Panga, J. B., Mathuva, E. and Egondi, P. (2020). Effects of Innovation of Transport Technology on freight transport firms ' performance in Mombasa County , Kenya. International Journal of Scientific Research and Innovative Technology, 7(2), 51–66.

Park, Y. S., Konge, L. and Artino, A. R. (2020). The Positivism Paradigm of Research. Academic Medicine, 95(5), 690–694.

Peker, I. (2016). Multiple Criteria Decision Model Suggestion for Determination of Technological Innovation of Logistics Firms. Journal of Social and Administrative Sciences, 3(March), 1–16.

REPOA. (2022). Enhancing Tanzania ' s Competitiveness in the Logistics Value Chain. REPOA.

Saunders, M., Lewis, P., & Thornhill, A. (2019). Research Methods For Business Students (Eighth Edi). Pearson.

Souto, J. E. (2015). Business model innovation and business concept innovation as the context of incremental innovation and radical innovation. Tourism Management, 51(2015), 142–155. https://doi.org/10.1016/j.tourman.2015.05.017.

Tanzania Invest (2020). *Tanzania Transport*.Tanzania Invest.https://www.tanzaniainvest.com/transport
URT. (2003). National Transport Policy 2003 (Vol. 1,p. 52).

Tijan, E., Aksentijevi, S. and Ivani, K. (2019). Blockchain Technology Implementation in Logistics. Sustainability, 11(4), 1185. https://doi.org/10.3390/su11041185.

Transport and ICT Department. (2013). Tanzania Transport Sector Review. African Development Bank Group, 146.

Tseng, P. (2013). Supply chain integration , information technology , market orientation and firm performance in container shipping firms. 2011. https://doi.org/10.1108/IJLM-09-2012-0088.

Tucci, J. E., Shin, S. and Benefield, M. (2015). Logistics Sustainability ?: Long Term Technology Investments and Integration. 5(2), 48–56. https://doi.org/10.5539/jms.v5n2p48.

Walasek, R., Stępnicka, N. and Lulek, A. (2021). Technological Innovation and Risk in the Management of Integrated Supply Chains – A Survey Results. European Research Studies Journal, 24(4B), 479–492.

Wang, M., Wood, L. C. and Wang, B. (2020). Logistics innovation capability and its impacts on the supply chain risks in the Industry 4 . 0 era. *Modern Supply Chain Research and Applications*, *2*(2), 83–98. https://doi.org/10.1108/MSCRA-07-2019-0015

Winkelhaus, S. and Grosse, E. H. (2019). Logistics 4 . 0 : a systematic review towards a new logistics system. International Journal of Production Research, 58(1), 18–43. https://doi.org/10.1080/00207543.2019.1612964.

Yang, C. and Chang, Y. (2019). Crucial factors influencing international logistics operations for African landlocked countries – A case study of Burkina Faso. Maritime Policy & Management, 00(00), 1–18. https://doi.org/10.10 80/0308883 9.2019.1606464.